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ABSTRACT

The Developer's Manual No. 5 is part of a set of 21 manuals (AA 001 009-001 029) used in APEX (Air Pollution Exercise), a computerized college and professional level "real world" game simulation of a community with urban and rural problems, industrial activities, and air pollution difficulties. The first two section, which are the same in each of the student manuals (volumes 1 to 19), contain general information about the APEX interaction simulation and a glossary of reference terms. The remaining sections contain the following: developer's role description; annotated developer's worksheet; a sample developer's worksheet; background information for developer's rcle; an annotated printout for cycle one; and a map of the 29 APEX analysis areas. The manual is identical to the other developer's manuals, except for the annotated printout for cycle one. The game simulation procedure and required computer facilities are further described in resumes for AA 001 009 and 001 010. (PR)

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Environmental Protection Agency

MARPLEX

VOLUME 15

DEVELOPE

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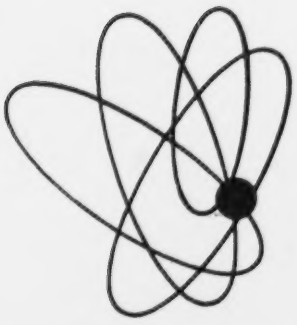

APEX VOLUME 15
DEVELOPER'S MANUAL
No. 5

This course is designed for professional persons in the field of air pollution control. The course manual has been prepared specifically for the trainees attending the course, and should not be included in the reading lists of periodicals as generally available.

CONDUCTED BY

The Office of Manpower Development's
Institute for Air Pollution Training

ENVIRONMENTAL PROTECTION AGENCY
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APEX•VOLUME 15
DEVELOPER No.5

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Volume 1: Game Director's Manual

Volume 2: Computer Operator's Manual

Volume 3: Air Pollution Control Officer's Manual

Volume 4: City Politician's Manual

Volume 5: County Politician's Manual

Volume 6: Industrialist's Manual: No. 1, Shear Power Company

Volume 7: Industrialist's Manual: No. 2, People's Pulp Plant

Volume 8: Industrialist's Manual: No. 3, Rusty's Iron Foundry

Volume 9: Industrialist's Manual: No. 5, Caesar's Rendering Plant

Volume 10: Industrialist's Manual: No. 6, Dusty Rhodes Cement Co.

Volume 11: Developer's Manual: No. 1

Volume 12: Developer's Manual: No. 2

Volume 13: Developer's Manual: No. 3

Volume 14: Developer's Manual: No. 4

Volume 15: Developer's Manual: No. 5

Volume 16: Developer's Manual: No. 6

Volume 17: Developer's Manual: No. 7

Volume 18: City Planner's Manual

Volume 19: County Planner's Manual

Volume 20: Reference Materials

Volume 21: Legal References: Air Pollution Control Legislation

ENVIRONMENTAL PROTECTION AGENCY

Office of Air Programs • Office of Manpower Development.
Institute for Air Pollution Training

The Institute for Air Pollution Training (1) conducts training for the development and improvement of State, regional, and local governmental air pollution control programs, (2) provides consultation and other training assistance to governmental agencies, educational institutions, industrial organizations, and others engaged in air pollution training activities, and (3) promotes the development and improvement of air pollution training programs in educational institutions and State, regional, and local governmental air pollution control agencies.

One of the principal mechanisms utilized to meet the Institute's goals is the intensive short term technical training course. A full time professional staff is responsible for the design, development and presentation of these courses. In addition the services of scientists, engineers and specialists from other EPA programs, governmental agencies, industry, and universities are used to augment and reinforce the Institute staff in the development and presentation of technical material.

Individual course objectives and desired learning outcomes are delineated to meet specific training needs. Subject matter areas covered include process evaluation and control, atmospheric sampling and analysis, field studies and air quality management. These courses are presented in the Institute's resident classroom and laboratories and at various field locations.

Harry P. Kramer, Sc. D.
Director, Office of Manpower Development

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APEX

Air Pollution Exercise

Simulation Exercises conducted by the Institute for Air Pollution Training

The responsibility of the Federal Government's Office of Air Programs to provide leadership and assistance to State and local air pollution control agencies in the recruitment and development of qualified personnel is a major theme of the 1970 Clean Air Act. The Office of Air Programs, (OAP) in conjunction with the University of Southern California and the University of Michigan, has created and developed a simulation exercise identified as APEX (Air Pollution Exercise). This exercise establishes a dynamic atmosphere in which the trainees participate in a "real world" simulation involving a community with urban and rural problems, industrial activities, and a variety of air pollution control problems.

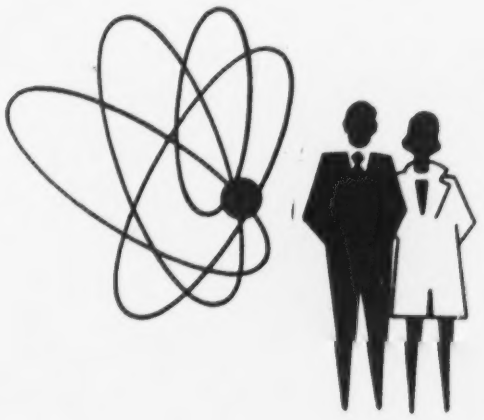
Current and projected uses of APEX have been developed through several of the University Consortia established in conjunction with OAP's Office of Manpower Development.

The use of simulation exercises for the training of air pollution control professionals offers two immediate and vital benefits:

1. A means is provided for a working application of theoretical knowledge; the learner applied information and skills to "real life"

situations. In addition, motivation directed toward additional learning results from participation in seeking solutions to the problems.

2. The focus is provided for solving problems through an interdisciplinary approach, where the interrelationship between "formal" areas of study and application becomes evident.



Students participating in APEX assume the roles of a number of decision makers: city and county politicians, city and county planners, developers, industrialists, air pollution control officers, and concerned citizens. Realistic data are supplied for each role, and the students are required to make decisions that are then analyzed by the computer. Next, the results of the decisions are presented as new situational data representing a year of "actual time." Students participating in these programs — which place special emphasis on air pollution problems — employ a wide range of skills and knowledge in a variety of areas. Additional opportunities for growth are provided through seminars, lectures, texts, and working contact with recognized authorities in a number of professions.

Within the overall format of the simulation exercise, emphasis is placed upon specific areas through the use of special situations, for example, hearings on air pollution standards or legal actions brought against a particular industry.

Additionally, preparations are underway to introduce APEX as a graduate course at OAP's new Technical Center in the fall of 1971 for students from the Triangle Universities Consortium. In addition to its use at the University of Southern California, APEX is now being conducted as a graduate course at the University of Illinois at Urbana and at Harvard University as part of an Environmental Education program for both graduate and undergraduate studies.

Section 1-1

Introduction to - APEX

APEX is one of, if not the most complex gaming-simulations of an urban area in use today. Although it was designed to supplement standard teaching methods, APEX is far more than an educational tool. It is a communication channel of a new kind -- capable of providing both the language and the forum for information transfer between persons and groups with different educational and cultural backgrounds as well as different prespectives on urban life.

APEX is composed of two essential components (1) a computerized system made up of a series of well-integrated simulation models (2) linked to a "gamed" environment encompassing a series of interactive roles. The computerized system predicts the changes that occur in several sectors of urban life in response to the decisions made by participants in the "gamed" environment, decisions made by persons outside the "gamed" environment (other actors whose behavior is simulated in the computer), and external pressures on the city (also simulated in the computer).

The county of APEX is run year by year by a set of elite decision makers performing both the mundane and extraordinary functions of their office in the "gamed" environment. Each cycle or year is condensed in time to a three to eight hour session during which the decision makers formulate their yearly policy. The decisions that emerge out of the "competitive-cooperative" environment of the gaming-simulation are used as priming inputs to the computer simulation. The change in the status of the urban area is calculated by the computer and returned to the decision makers as the primary input to the next cycle of action. Included in the change picture generated by the computer are selected social indicators measuring the magnitudes of change in assorted key areas and a newspaper serving as the focal point of local public opinion.

The key decision makers acting in the gamed environment include politicians and planners from a central city and a county, an air pollution control officer from the county, and land developers and industrialists from the private sector. The politicians are responsible for the administration of their respective jurisdictions and for the formulation and implementation of various programs to upgrade the social status of their constituents. The planners serve as aides to the politicians and represent the major long range coordinating force in the community. The air pollution control officer is charged with the task of cleaning and monitoring the air mass above APEX county. The land developers and industrialists have the responsibility of running their particular business concerns within the confines of the county. It is expected that each decision maker will find it to his advantage to coordinate and/or compete with other players in his efforts to promote his strategies. The APEX General Interaction Diagram included here (see page) indicates possible linkages among players and between players and the simulation.

In general, people have great difficulty understanding the dynamics of a complex system through traditional means. Gaming-simulation offers participants the opportunity to study, work with, and discuss the struc-

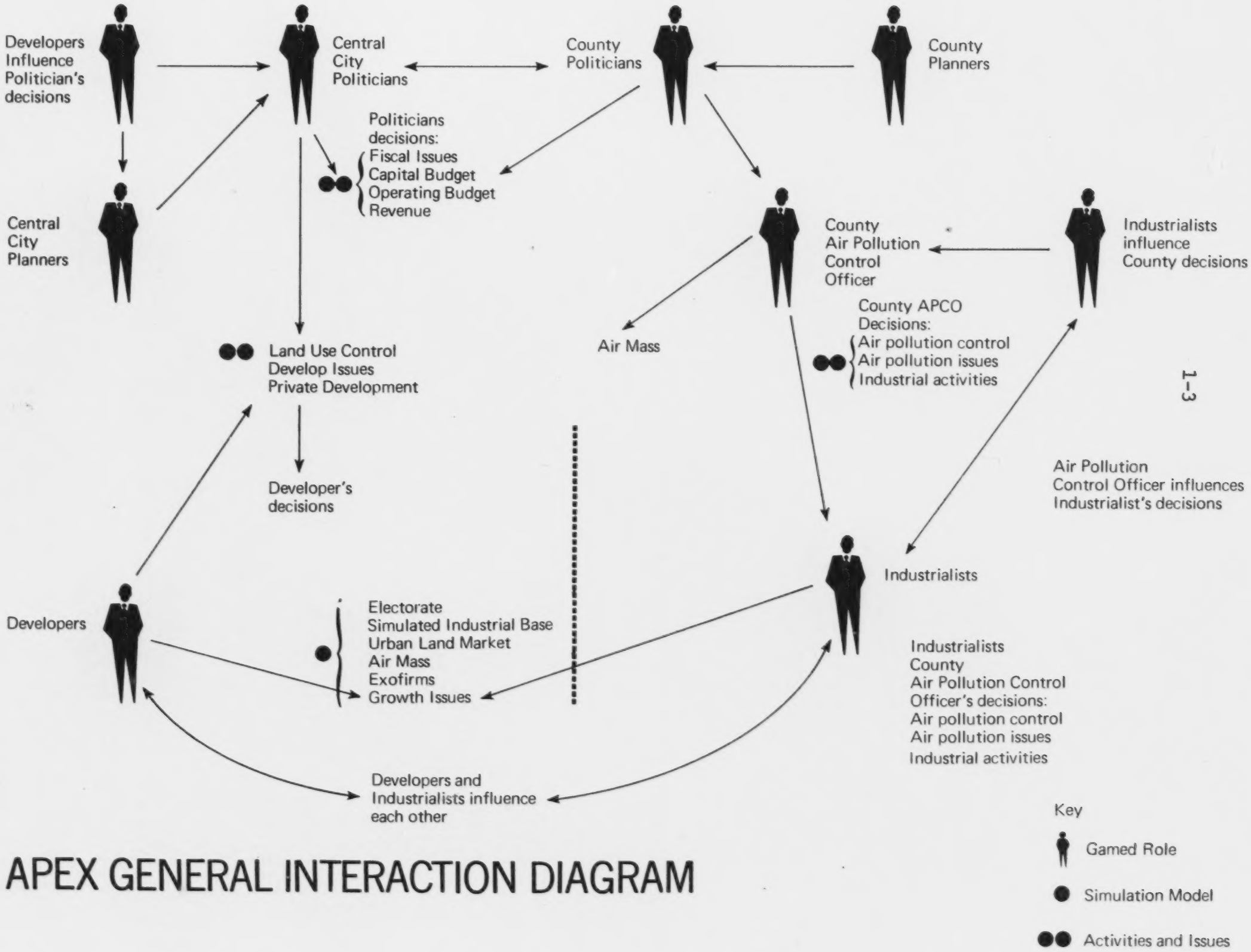
ture of such a system and to experiment with intervention strategies designed to change that structure. When used as a teaching device, the strength of a gaming-simulation such as APEX lies in the opportunity afforded participants for involvemnt in the system. When compared with the passive observation of the system offered by traditional methods, this approach has had great success.

In theory, complex gaming-simulation of the APEX variety is more than a training device or communications facilitator. If the models were more sophisticated the data base more accurate and more complete, a complex gaming-simulation would be a policy testing device for use by practicing urban politicians, planners, APCO's and administrators. Conditional predictions (predictions based on the particular policies and/or decisions submitted to the model) of the ramifications of various decisions can be generated through the use of a complex gaming-simulation -- predictions that may forewarn the model user of unforeseen reactions to policy at several levels of the urban hierarchy ranging from that of the highest level.

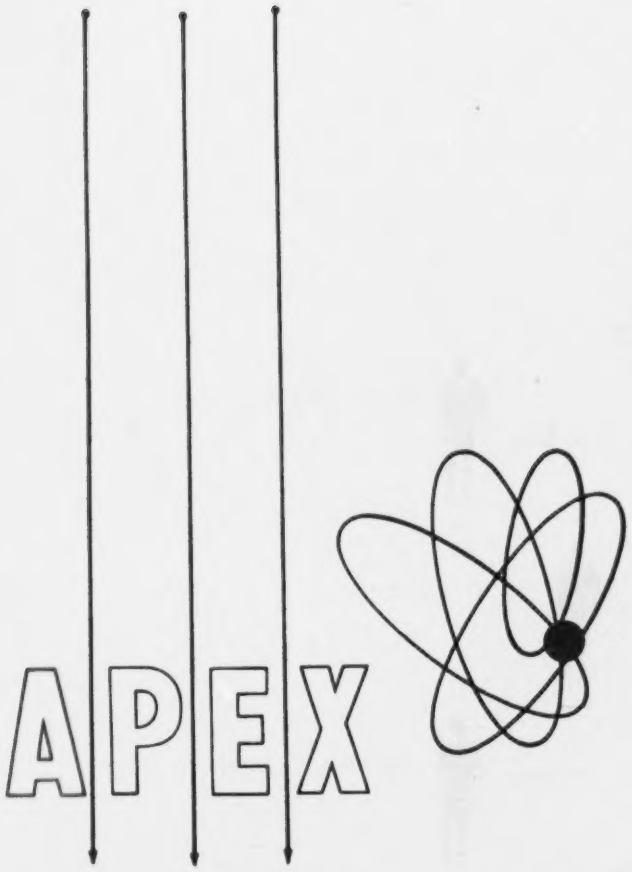
The gamed environment is similar to that found in a typical midwestern industrialized town. (In fact, the prototype city is Lansing, Michigan). It has a population approaching 220,000 including several of minority groups sharing racial or ethnic ties. There is a relatively dense central city in the heart of the county, an adjacent suburb and two outlying townships. Most of the industry is located in the central city (as are the minority groups). Major firms include a large auto plant and the state government offices. The suburb houses a major university. The townships are largely agricultural, although urbanizing settlements are dotting the landscapes. There is a major river running through the city serving as the primary drainage system for the county. The climate of APEX is temperate, with summer temperatures averaging about 70 degrees and winter temperatures averaging near 25 degrees. Prevailing winds are westerly, swinging to the southwest in summer and northwest in winter.

For the purposes of the gaming exercise, APEX county is divided into 29 analysis areas (see the attached map, Section 9). Population, employment and land use will be allocated to the areas and are categorized by types established especially for APEX. These types are described in the glossary included in this manual (Section 2) a glossary designed to aid participants in learning the terminology of urban and environmental management as well as that of the gaming exercise.

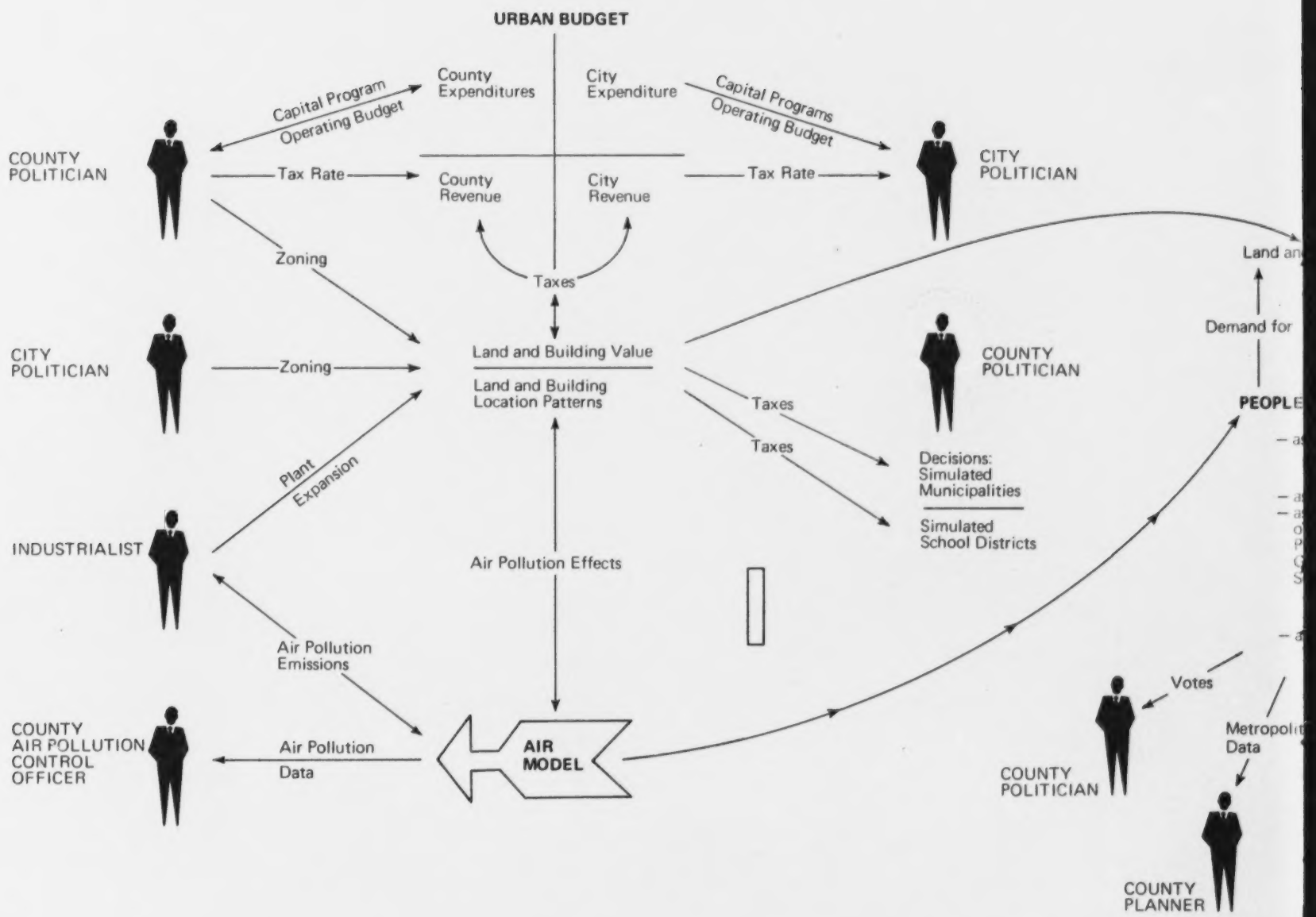
FOR ADDITIONAL INFORMATION:
Address inquiries to Chief, Institute for Air Pollution Training
Environmental Protection Agency
Research Triangle Park, North Carolina 27711



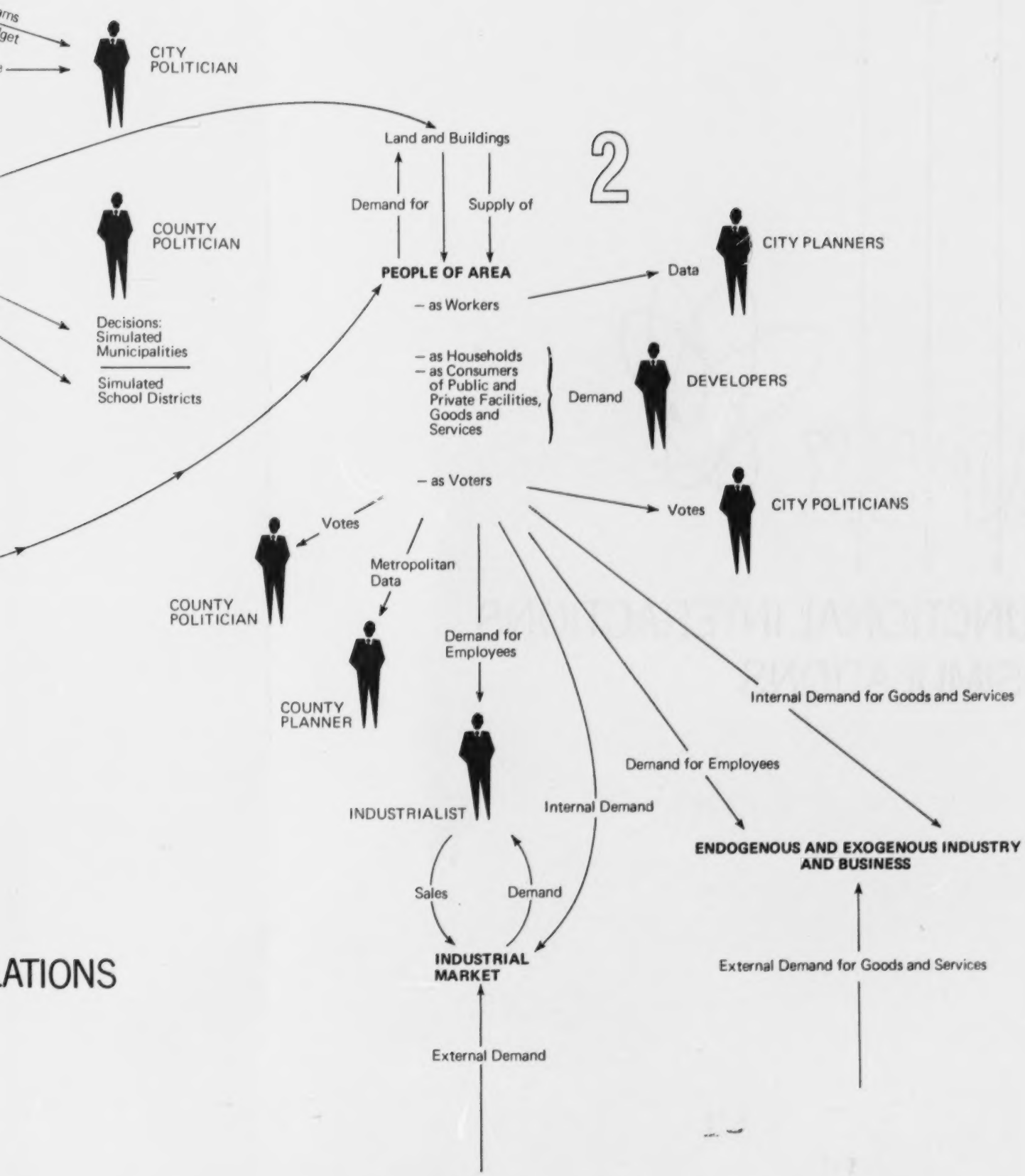
APEX GENERAL INTERACTION DIAGRAM



FUNCTIONAL INTERACTIONS
● SIMULATIONS



APEX FUNCTIONAL INTERACTIONS ● SIMULATIONS


CITY POLITICIAN
Land and Buildings
2
COUNTY POLITICIAN
Demand for
Supply of
CITY PLANNERS
PEOPLE OF AREA
Data
– as Workers
Decisions:
Simulated
Municipalities
Simulated
School Districts
– as Households
– as Consumers of Public and Private Facilities, Goods and Services
Demand
DEVELOPERS
– as Voters
Votes
CITY POLITICIANS
Votes
Metropolitan Data
COUNTY POLITICIAN
Demand for Employees
COUNTY PLANNER
Internal Demand for Goods and Services
Demand for Employees
INDUSTRIALIST
Internal Demand
ENDOGENOUS AND EXOGENOUS INDUSTRY AND BUSINESS
Sales
Demand
INDUSTRIAL MARKET
External Demand for Goods and Services
External Demand

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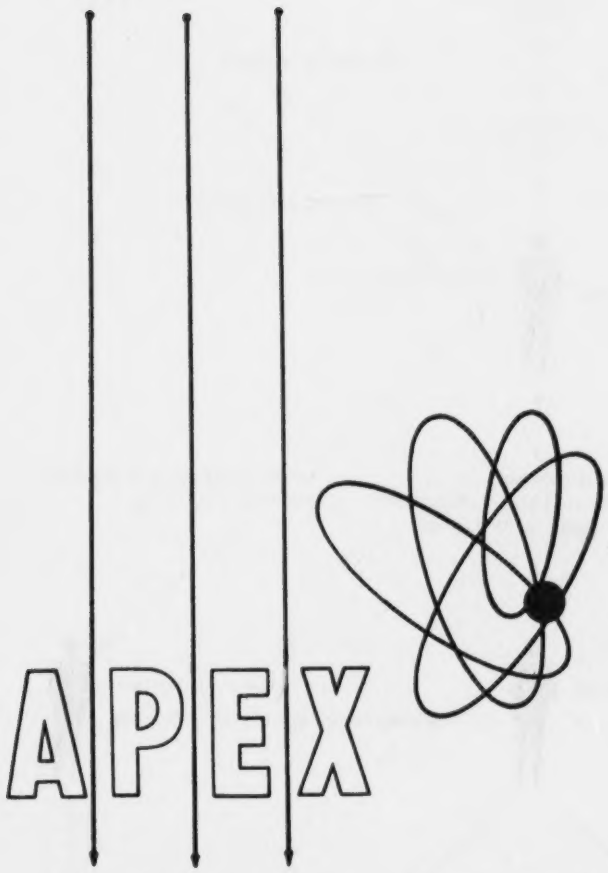
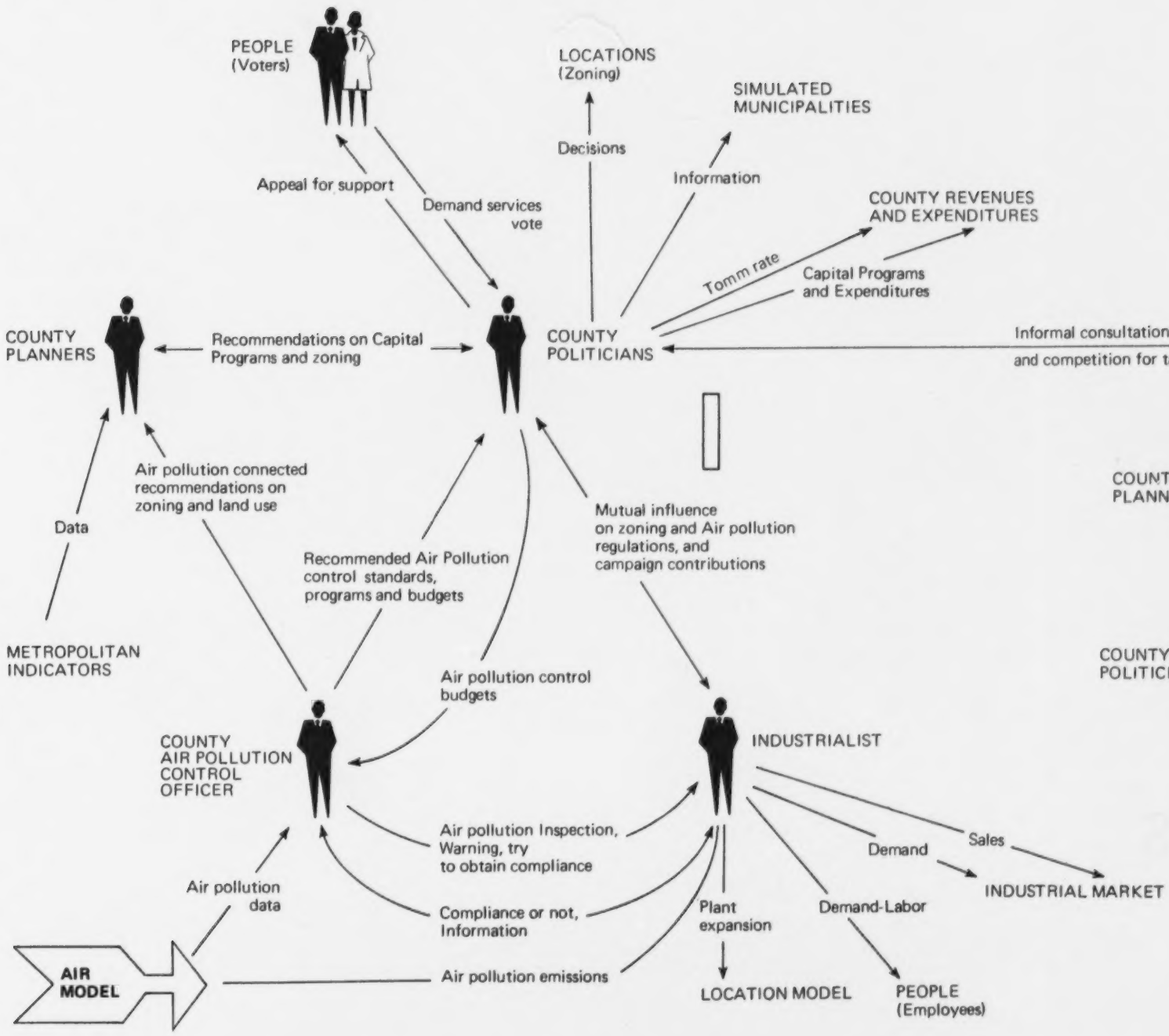
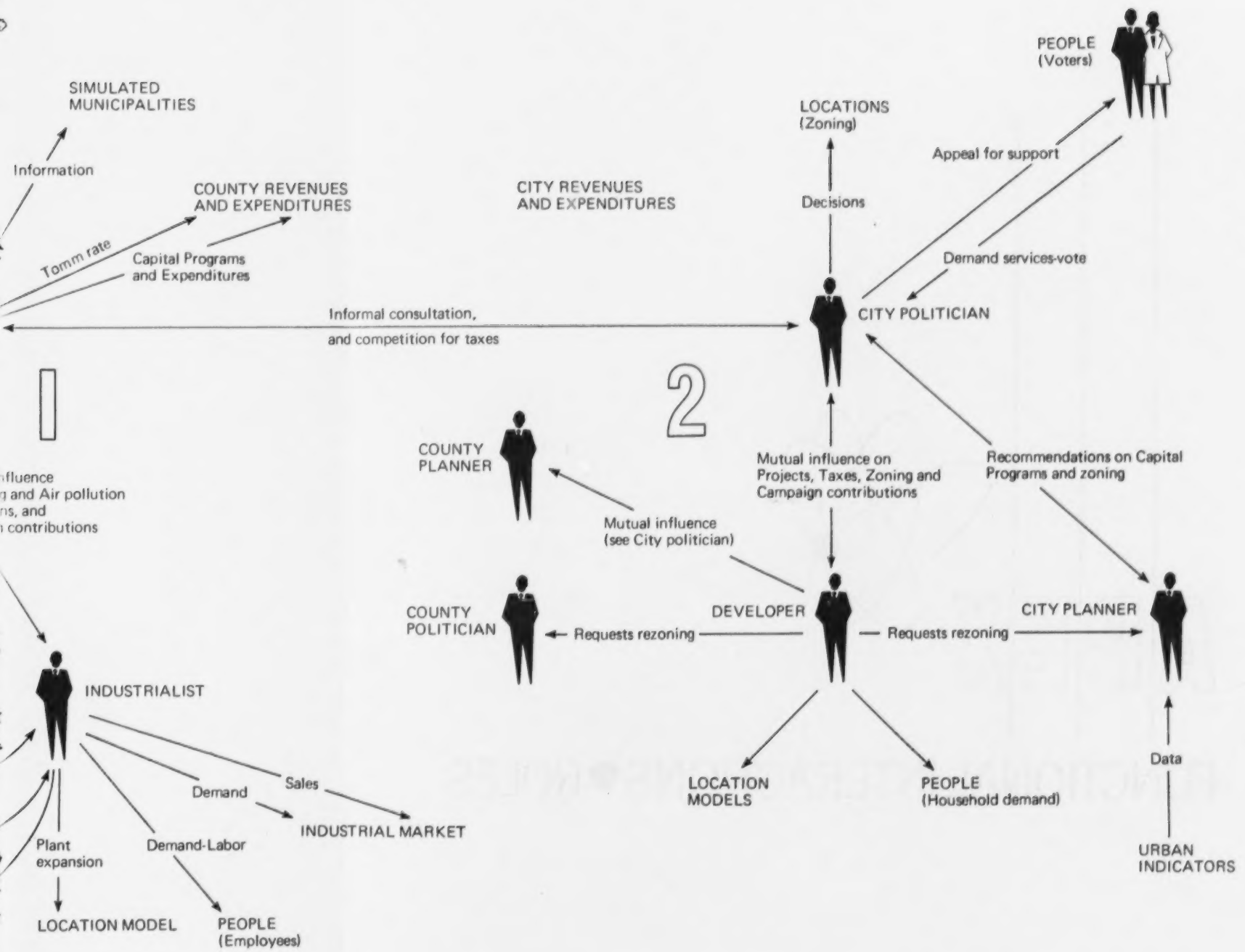


FUNCTIONAL INTERACTIONS ● ROLES


PEOPLE
(Voters)
LOCATIONS
(Zoning)
SIMULATED
MUNICIPALITIES
Decisions
Information
Appeal for support
Demand services
vote
COUNTY REVENUES
AND EXPENDITURES
Tomm rate
Capital Programs
and Expenditures
COUNTY
PLANNERS
Recommendations on Capital
Programs and zoning
COUNTY
POLITICIANS
Informal consultation,
and competition for taxes
Air pollution connected
recommendations on
zoning and land use
Data
Recommended Air Pollution
control standards,
programs and budgets
Mutual influence
on zoning and Air pollution
regulations, and
campaign contributions
METROPOLITAN
INDICATORS
Air pollution control
budgets
COUNTY
AIR POLLUTION
CONTROL
OFFICER
INDUSTRIALIST
Air pollution Inspection,
Warning, try
to obtain compliance
Sales
Demand
INDUSTRIAL MARKET
Air pollution
data
Compliance or not,
Information
Plant
expansion
Demand-Labor
AIR
MODEL
Air pollution emissions
LOCATION MODEL
PEOPLE
(Employees)
COUNTY
PLANNER
COUNTY
POLITICIAN

APEX FUNCTI



APEX FUNCTIONAL INTERACTIONS ● ROLES

Section 2-1

GLOSSARY AND REFERENCE TERMS

ABATEMENT

Abatement is the reduction of pollutant emissions from a source or sources.

AIR POLLUTION

Air pollution is the presence in the outdoor air of substances which, when present in sufficient quantity or over a period of time, can cause an undesirable effect upon man, property, or the environment.

AIR POLLUTION REGULATIONS

Air pollution regulations are legal constraints on pollutant emissions, production processes, or control systems. State regulations and County regulations are enforceable by legal sanctions, while recommendations are not.

AIR QUALITY

Air quality refers to the pollution concentration characteristics of the atmosphere or ambient air in a given area. It is usually stated in terms of the levels of concentration of specific pollutants, in parts of pollutant per million parts of air. (See CONCENTRATION.)

Air Quality Goals are expressions of desirable maximum pollutant concentrations to be achieved through a pollution control program.

Air Quality Standards are quantitatively-specified maximum levels of pollutant concentrations or dosages, as more precise statements of air quality goals.

ALERT STAGES

Alert Stages refer to critical levels of concentration or dosage signalling potential disastrous pollution effects and requiring emergency abatement and control measures.

ANALYSIS AREA (A.A.)

Analysis areas are used as the primary areal reference units for the data and issues throughout the game. The County is divided into a number of analysis areas, each of which is the approximate size of several census tracts. The analysis areas included in the five jurisdictions are as follows:

Jurisdiction 1 -- Central City: Ward 1 = AA 1 through AA 4
Ward 2 = AA 5 through AA 8
Ward 3 = AA 9 through AA 13

Jurisdiction 2 -- Suburb: AA 17 through AA 19

Jurisdiction 3 -- Township 1: AA 23 through AA 28

Jurisdiction 4 -- Township 2: AA's 14-16, 20-22, 29

Jurisdiction 5 -- County: AA's 1-29

(See APEX Analysis Area map)

ANNUAL WAGE

This is the annual cost to the Industrialist of one worker and is an average of the various rates of pay applicable to the different types of workers in the firm. The applicable average wage rate for each firm is reported in the Industrialist's output each cycle under cost factors.

ASSESSED VALUE

Assessed value is the value assigned to real estate property for purposes of assessing taxes owed to each of the Jurisdictions, County and school districts. Governments are required by law to maintain an assessed value of 50% of market value for property in their jurisdiction, although this requirement is often not met. (E.g. if a residential property is valued on the market at $20,000, its assessed value is $10,000.) (See STATE EQUALIZED VALUE.)

BOARD OF DIRECTORS

Each Industrialist acts as a Plant Manager and is responsible to the Board of Directors of his plant for his decisions and actions. The Board has the ultimate decision-making power in Plant affairs and may approve, amend or reject the Manager's fiscal policy proposal. The Board also sets the amount of dividends to be paid to the stockholders.

BONDING

Bonding is the process of incurring public debt to finance some capital improvement project. It is a device used to extend the incidence of costs over a long period of time, rather than have costs met out of current revenues while the project is under construction. Politicians may issue two kinds of bonds, general obligation bonds and revenue bonds. These differ in three respects: (1) the need for voter concurrence, (2) how they are paid off, and (3) the kinds of projects for which they are appropriate. Before Politicians may float general obligation bonds to finance projects, voters must approve this action in a referendum. There is a State-imposed limit on the indebtedness that a jurisdiction may incur through general obligation bonds. The amount of additional

bonded indebtedness that can be sought is indicated in the Politician's output as "$ Limit on Next Bond Sought".
(See DEBT RETIREMENT for the process of financing general obligation bonds.)
Revenue bonds are not submitted to a referendum and are appropriate only for particular projects. (Projects for which they may be used are noted in the Project List.) They are paid off through fees collected for the service provided by the facility, rather than by taxes.

CAPITAL PLANT INDEX (C.P.I.)

The capital plant index is a ratio of the present dollar value of public capital facilities (sewers, water lines, streets, parks and miscellaneous public holdings) to population equivalents. This number reflects the load imposed on facilities by residents, employees and clients, and thus is considered as an indication of the relative level of adequacy of these facilities. Present dollar value is calculated each cycle on the basis of depreciated value of existing facilities plus new facilities. (Facilities depreciate at about 5% of original value per year.)
(See POPULATION EQUIVALENT.)

CASH CARRYOVER

This is the cash reserve which an Industrialist or Developer carries over to the next cycle after making all his expenditures, including those for capital plant. It represents as-yet uncommited funds, which the player is free to use in the next cycle.

CASH TRANSFER

A cash transfer is used for loans or gifts of cash between players when the reason for the exchange is unspecified. Revenues made, or expenditures incurred, through an exchange of cash between either the Government, Industrialist, or Developer, are recorded in the budget section of the output. When applicable, cash transfers are also used to cover the cost of television time and newspaper articles.

COMBUSTION

Combustion is the process of burning fuel or wastes.

CONCENTRATION

Concentration is the ratio of pollutants to effluent gases or ambient air, measured in parts per million (ppm) as a volume to volume ratio, or micrograms per cubic meter (UG/cubic meter) as a weight to volume ratio. Data on mean concentration per quarter, concentration on worst day, and number of days above a specified concentration can be obtained by the APCO, through the installation and operation of monitoring stations.

CONTAMINANT See POLLUTANT

CONTROL EFFICIENCY

Control efficiency refers to the ratio of the amount of a pollutant removed from effluent gases by a control device to the total amount of pollutant without control.

CONTROL SYSTEM

Control system refers to equipment and/or procedures intended to reduce the amount of a pollutant, or pollutants, in effluent gases. Each gamed industrial firm has a limited set of control system options for each production or combustion process.

DEBT RETIREMENT (Debt Service)

Debt retirement, or debt service, is a term used to describe the process of paying off long-term general obligation bonds sold by public agencies. Debt retirement is a budget category of the Politician which includes expenditures for both principal and interest on general obligation bonds. Financing of these expenditures may be with either normal millage or debt retirement millage.

DEMOLITION COSTS (Clearance Costs)

A demolition cost of 5% of the assessed value of developed property must be paid when developed land is rezoned.

DENSITY

In residential areas, density is the term used to express the number of dwelling units per acre of land. In APEX a different density is associated with each of the five residential development types, with the lowest density found in land use category R-1 and the highest in category M-2.
The table on the following page expresses housing density in housing units per acre, and in acres per housing unit.

DEPRECIATION ALLOWANCE

Each cycle, the total value of capital facilities, (building and equipment) depreciate. A tax credit of 5% of the capital value facilities is allowed the industrialist to compensate for this depreciation. The amount is deducted before Federal and State income taxes are paid. The industrialist may claim any part of his maximum allowance; any portion of the allowance not taken will accumulate. The maximum depreciation allowance is listed under cost factors in the industrialist's output.

HOUSING DENSITY

AA	R-1		R-2		R-3		M-1		M-2	
	Units per Acre	Acres per Unit	Units per Acre	Acres per Unit	Units per Acre	Acres per Unit	Units per Acre	Acres per Unit	Units per Acre	Acres per Unit
1	1.4	.71	3.5	.29	5.6	.178	11.2	.089	21.0	.047
2	2.4	.41	6.0	.16	9.6	.104	19.2	.052	36.0	.027
3	2.0	.5	5.0	.20	8.0	.125	16.0	.062	30.0	.033
4	2.8	.35	7.0	.14	11.2	.089	22.4	.046	42.0	.023
5	2.1	.47	5.3	.18	8.4	.119	16.8	.059	31.5	.031
6	1.6	.62	4.0	.25	6.4	.156	12.8	.078	24.0	.041
7	2.5	.4	6.3	.15	10.0	.10	20.0	.050	37.5	.026
8	3.0	.33	7.5	.13	12.0	.083	24.0	.041	45.0	.022
9	1.2	.83	3.0	.33	4.8	.208	9.6	.104	18.0	.055
10	2.5	.4	6.3	.158	10.0	.10	20.0	.050	37.5	.026
11	1.0	1.	2.5	.4	4.0	.25	8.0	.125	15.0	.066
12	1.0	1.	2.5	.4	4.0	.25	8.0	.125	15.0	.066
13	1.0	1.	2.5	.4	4.0	.25	8.0	.125	15.0	.066
14	.5	2.	1.3	.76	2.0	.5	4.0	.25	7.5	.013
15	.6	1.66	1.5	.66	2.4	.41	4.3	.208	9.0	.011
16	.8	1.25	2.0	.5	3.2	.31	6.4	.156	12.0	.083
17	1.2	.83	3.0	.33	4.8	.208	9.6	.104	18.0	.055
18	2.3	.43	5.8	.172	9.2	.108	18.4	.054	34.5	.028
19	3.0	.33	7.5	.13	12.0	.083	24.0	.041	45.0	.022
20	.8	1.25	2.0	.5	3.2	.31	6.4	.156	12.0	.083
21	.5	2.	1.3	.76	2.0	.5	4.0	.25	7.5	.013
22	.4	2.5	1.0	1.	1.6	.62	3.2	.31	6.0	.16
23	.7	1.42	1.8	.55	2.8	.35	5.6	.178	10.5	.095
24	.3	3.33	.8	1.25	1.2	.83	2.4	.41	4.5	.022
25	.4	2.5	1.0	1.0	1.6	.62	3.2	.31	6.0	.16
26	.3	3.33	.8	1.25	1.2	.83	2.4	.41	4.5	.022
27	.6	1.66	1.5	.66	2.4	.41	4.8	.208	9.0	.011
28	.3	3.33	.8	1.25	1.2	.83	2.4	.41	4.5	.022
29	.5	2.	1.3	.76	2.0	.5	4.0	.25	7.5	.013

DEVELOPMENT TYPES AND COSTS

A. Residential

In APEX there are various levels of cost and density associated with different qualities and sizes of housing which may be built by Developers. These costs are for structures, exclusive of land and site improvements.

Single Family

Three different development-cost levels are applicable to APEX single-family housing units, ranging from the highest construction cost of $40,000 (designated as R-1) to the lowest cost housing, built at $15,000 per unit (designated as R-3). Any one of these types may be built on land which, when vacant, is zoned R.

Multiple Family

Units of two different cost levels, M-1 and M-2, are available for construction of multi-family housing in APEX. The highest cost per unit, for M-1, is $30,000 and the lowest, for M-2, is $12,000. Either of these types may be constructed on vacant land zoned M.

Residential Development Costs per Unit

R-1	R-2	R-3	M-1	M-2
$40,000	$22,500	$15,000	$30,000	$12,000

B. Commercial

Two types of commercial land use are allowable in APEX. These relate to local neighborhood shopping facilities and to regionally-oriented commercial and service facilities. Both may be built only on zoning category C land. Each is developed on a cost-per-acre basis, as follows:

Commercial Development Costs by Type

CL	CR
$100,000	$125,000

C. Industrial

Endogenous industrial development permitted Developers in APEX is on a per-acre basis, the cost being $100,000 per acre. Zoning category I land may be developed into this land use.

(See ZONING CATEGORY.)

DOSAGE

The specified time duration of an air pollutant's critical concentration level in a particular location, or for a particular person, material, etc., is known as dosage.

EFFLUENT

Effluents are the total gaseous emissions from production and combustion processes and activities, including air pollutants and non-noxious material.

ELITE OPINION POLL (E.O.P.)

The Elite Opinion Poll calls for a vote of all game players on certain major policy issues in the community. These issues appear as headlines in the M.E.T.R.O.-APEX News, which ask for either a deciding or advisory vote. The results of the Poll affect public officials' chances of re-election, as well as the probabilities of passage of general referenda and specific bond issue and special millage requests.

EMISSIONS

Emissions are pollutants in effluent or exhaust gases which are released into the air.

EMISSION FACTORS

Emission factors are estimates which can be used to approximate the rate of emissions of specific pollutants from generalized sources.

EMISSION MEASUREMENT

Air pollution emissions are measured in pounds per hour for particulates, sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen oxides (NO_x), and hydrocarbons (HC); in Ringelmann number for smoke; and in Stinkelmann number for odor. The emissions measured are of specific pollutants from specific sources.

EMISSION RATE

Emission rate refers to the amount of pollutant emitted per unit of time. Maximum allowable emissions will be specified in pounds per hour if they refer to emission rates.

EMISSIONS SOURCE

An emission source is the origin of some specific air pollutants. In the game there are several gamed point sources, about thirty non-gamed point sources, plus motor vehicles and space heating as line and area sources, respectively.

EXOFIRM (EXOGENOUS FIRM)

An Exofirm is an industry or bureaucratic firm that depends primarily upon markets outside the local area for its growth and vitality. These firms are usually classified as Exofirms on the basis of their being net importers of dollars and net exporters of products or services to these outside markets. Jobs created by Exofirm growth spur additional growth of households and jobs oriented to the local market. (Exofirms are also often referred to as basic firms).
In APEX, Exofirms locate in zoning categories I and O.
Periodically, the newspaper will note the opportunity for Developers to invest, in a speculative way, in the entry of new Exofirms into the metropolitan area, with a variable probability of success attached to such investments. Occasionally, these Exofirms require rezoning of land and/or installation of special capital improvements. Requirements for such special public action and requests for private investment will be noted in the newspaper announcement of the firm's interest in locating in the area.

FUEL RATE

The amount of fuel consumed by each industry per unit of time is specified in tons/hours for coal, in barrels (bbl)/hour for oil, in thousand cubic feet (MCF)/hour for natural gas, and in megawatts (MW) for electricity.

FUEL TYPE

The fuel type possibilities include: low-grade coal (Lo-Coal), high-grade coal (Hi-Coal), low-grade oil (Lo-Oil), high-grade oil (Hi-Oil), natural gas, and electricity. The fuel option for each plant is listed in the Industrialist's output. The fuel grade refers inversely to the air pollution potential of the burning fuel, i.e., Lo-Grade has high pollution potential, and Hi-Grade fuels have low pollution potential.

HOUSEHOLD TYPES

The five household types used in APEX are characterizations of families belonging to fairly homogeneous socio-economic groups. These characterizations reflect life style, political involvement and voting habits, general consumption behavior and preference for public goods. There is substantial overlap of income levels for all status groupings; hence income, alone, is a weak indicator for characterizing households.

Household Type 1 -- is upper class and upper-middle class combined. Occupations of the heads of households are: professionals, technical workers, managers, officials, and proprietors. One-half of the family income levels are in excess of $15,000 and the other half are in the $10,000-$15,000 range. Value of housing is in excess of $20,000, and if they rent, rentals are over $150 per month. This is the group which is most concentrated in residential location. Education of the head of the household is at least college graduate, often with post-graduate study. Pressure group membership for this household type is found in the Chamber of Commerce and Good Government League.

Household Type II -- is the typical middle-class household in which the head's occupation is clerical, sales, or kindred types. Income of the family is primarily in the $7,000-$10,000 range. Education of the head of the household is some college or at least high school graduation. Housing value is primarily in the $15,000-$25,000 range, and gross rentals would usually be from $100 to $149 per month, though they may be somewhat lower. Pressure group affiliations for this type are with the Good Government League on the one hand, and with the ultra-conservatives on the other.

Household Type III -- the most numerous and widely-distributed of the five types is characterized by a mixed membership of very low income white collar workers, skilled craftsmen, and foremen, though the latter two predominate. In the outlying areas, farmers fall into this category. Family income is primarily in the $5,000-$9,000 range. The head of household's education is typically high school graduation. Housing value is usually in the $12,000-$20,000 range and rentals are from $80-$125 per month. Members of this group are apt to belong to the unions and/or the ultra-conservative pressure group.

Household Type IV -- is composed of semi-skilled workers, industry operatives and non-household service workers, such as waiters, barbers and parking-lot attendants. Family income is in the lower portion of the $4,000-$7,000 range. Housing values range from $10,000 to $14,000 with gross rentals being $70 to $90 per month. Education of the head of the household is usually 9 to 11 years. Pressure group membership for this household type is found in the unions and among the civil rights groups.

Household Type V -- is the lowest stratum of society, and heads of households are laborers or household service workers. The vast majority of the area's unemployed are of this type and roughly half of all members are elderly and retired. Family income is less than $5,000 annually and the value of housing is less than $10,000, with rentals primarily $50-$75 per month. Heads of households have usually not been educated beyond the eighth grade. Membership in pressure groups is found in the unions and civil rights groups.

Political involvement of the five household types declines from type I (the highest) to type V, the latter being generally apathetic. Likewise, concern with government operation and provision of public services is highest in type I households and declines steadily through type V families.
The five household types will tend to demand housing of the five residential development types according to the following percentages:

Household type I -- 50% will choose R-1; 30%, R-2, and 20%, M-1.
Household type II -- 20% will choose housing in each of the five development types.
Household type III -- 10% prefer R-1; 30% prefer R-2; 20% choose R-3; 25% take M-1, and 15%, M-2.
Household type IV -- 20% will choose R-2; 40%, R-3; 10%, M-1, and 30%, M-2.
Household type V -- 40% will be in R-3; 60% in M-2.

IMPROVEMENT COSTS

Improvement costs are fees to prepare raw land for development, including subdivision costs, sewer and water connections, drainage and engineering. Developers are required to pay improvement costs on all land on which they build structures. For residential property, improvement costs are on a per unit basis as follows:

R-1	R-2	R-3	M-1	M-2
$1,000	$800	$700	$600	$400

For commercial and local industrial land uses, improvement costs are on a per acre basis; for each the fee is $5,000 per acre.

These fees are automatically applied to all land on which the Developer builds.

INTEREST RATE

The cost of borrowing money will vary for the Industrialists and Developers according to both their credit rating and the length of the loan, i.e., how many years will be taken to repay it. Applicable interest rates are as follows:

	Credit Rating		
Years to Repay	A-1	A-2	A-3
1-2	4%	6%	8%
3-5	6%	8%	12%
6-10	8%	12%	16%
11-20	12%	16%	20%

The cost of borrowing money for governmental agencies -- the interest rate on bonds -- will vary according to the credit rating of the jurisdiction, and will differ between general obligation and revenue bonds. Since revenue bonds are not backed by governmental taxing power they are riskier and therefore carry higher interest rates than general obligation bonds. As a jurisdiction's credit rating falls from A-1 to A-3, the interest rate on general obligation bonds will increase from 4.5% to 6%.

ISSUE

Issue is used to refer to a problem situation presented to players in the APEX News. Following each issue are two to four alternatives from which one must be selected. (See ELITE OPINION POLL.)

JURISDICTION

Jurisdiction refers to one of the political units in APEX. Abbreviations used in the game are:

CC - Central City (Jurisdiction 1)
S - Suburb (Jurisdiction 2)
UT 1 - Township 1 (Jurisdiction 3 or Western Township)
UT 2 - Township 2 (Jurisdiction 4 or Eastern Township)
Co - County (Jurisdiction 5)

(See ANALYSIS AREA.)

LAND USE

Land use refers to the types of structures built upon particular pieces of land.

(See DEVELOPMENT TYPE and ZONING CATEGORY.)

MAXIMUM PRODUCTION CAPACITY

This is the maximum number of units which can be produced by a gamed industry in a cycle, given the plant and equipment in existence during that cycle. Maximum capacity may be increased by making capital expenditures for building and equipment. New productive capacity becomes available only in the cycle following that in which money is budgeted for plant expansion.

MILLAGE

Millage is the tax rate, in mills, which is applied to State equalized property value to generate property tax revenue. One mill is equal to a $1 charge on each $1000 of value, or one tenth of one percent of the State equalized value. There are three types of millage:

A. Normal Operating Millage is determined by local Politicians and is applied to standard operating costs of government by State and local law -- the local limit can never be higher than the limit set by the State.

B. Special Millage, which is not subject to State and local limits, can be used for financing special programs. It must be voted on in a referendum.

C. Debt Retirement Millage is not subject to the state and local limits but it can be used for retiring capital project bonds. This millage requires a favorable vote in a referendum.

Total millage is the sum of operating millage, any special millages and the debt retirement millages which may be in effect during the year.

MONITORING STATION

A monitoring station is a piece of equipment placed at a given location for measurement of air quality. An air quality monitoring station of one of five types may be installed and operated in any analysis area. The pollutants measured by each type of monitoring station are:

Type 1: Particulates
Type 2: Particulates and SO_2
Type 3: Particulates, SO_2, and CO
Type 4: Particulates, SO_2, CO, and NO_x
Type 5: Particulates, SO_2, CO, NO_x, and Hydrocarbons

PARTICULATES

Particulates are solid particle air pollutants, which may be suspended in the air or may settle out, depending on the size of the particles, wind speed, and other factors.

PLANT INSPECTION

A plant inspection is an "on-site" examination of production and pollution control equipment, processes and procedures. Plant Inspections ordered by the APCO will provide him with information on the production processes; production capacity; fuel and process rates; control systems; smoke code (Ringelmann number); and odor code (Stinkelmann number) for each process of a specific gamed or non-gamed emission source.

PLANT MANAGER

The player in the role of Industrialist is acting as a Plant Manager. (See BOARD OF DIRECTORS.)

POPULATION EQUIVALENT

The population equivalent is a means of converting (a) residents, and (b) employees and clients of industries and commercial facilties into a standard measure of the demand placed on such public capital facilities as sewers, streets, and water supply. The population equivalent of an area (analysis area or jurisdiction) is computed as follows:

P.E. =[Total households]+[.8 × all employees of commerce and industry]

For use of population equivalents in APEX, see CAPITAL PLANT INDEX.

PRESSURE GROUP

There are five pressure groups represented in APEX which take stands on public policy issues and can influence voter behavior. The more extreme the position assumed by the pressure groups, either pro or con, (as indicated by a scale of +4 to -4), the greater will be the voter turnout for referenda and elections. Each pressure group derives its constituency from members of two or more household types. (See HOUSEHOLD TYPES)

1. Civil Rights Groups -- find their leadership in the elite liberal and in ghetto activists. The majority of their followers come from lower social strata. These groups represent both Negroes and Mexican-Americans. The orientation of the groups is primarily toward what they consider bread-and-butter issues, such as fair employment, and toward actions which focus on the neighborhoods in which they live. Thus, the Civil Rights groups tend to be active in specific cases, but their influence is moderate.

2. Good Government League -- is overwhelmingly middle-class, composed primarily of professional people, a heavy percentage of them women. This group is interested in a wide range of issues, in which they exert moderate influence, and is oriented toward governmental efficiency and toward community growth and image.

3. Chamber of Commerce -- draws many members from the business community and some from professional groups such as law, engineering, and medicine. This group exerts the highest degree of power of all pressure groups and is oriented primarily toward community image and "boosterism". However, when an issue tends to split the business community, this group is likely to take no position.

4. Unions -- are more conservative locally than nationally and exhibit some divergency between craft unions and industrial unions, the former being more conservative. The unions exert moderate influence on a range of issues somewhat less broad than those of interest to the Good Government League. The conservatism of the unions is especially apparent in the opposition of some of its constituency to public spending for social welfare.

5. Ultra-Conservatives -- draw membership from people who are isolated from most community affairs. Although members have average incomes, the education level of most is lower than the community average. These groups become involved in public issues only sporadically, taking extreme and noisy positions when they feel personally affected by proposed public actions.

PROCESS RATE

Process rate refers to the amount of materials processed by an Industrialist per unit time. The measure is specified in tons, pounds, barrels, per minute, hour, etc.

PRODUCTION LEVEL

This is probably the key item determined by an Industrialist each cycle. It is the number of units of a product his plant will produce in that cycle. The Industrialist is free to set his production at any level he chooses, as long as the figure he sets does not exceed his maximum production capacity.

PRODUCTION PROCESS

A production process is a definable part of the overall production system

of a given firm. Each gamed industrial firm may have up to eight production processes, while each non-gamed industrial firm is assumed to have only one process.

QUASI-PUBLIC LAND

This is land owned by tax-exempt organizations such as churches and fraternal organizations. Such land includes church buildings and schools, cemeteries and such miscellaneous buildings as Elks lodges.

REFERENDUM

A referendum is a vote of the (simulated) population of a jurisdiction on some issue presented to the people by the Politician. Most usually referenda are called to approve (or reject) a general obligation bond issue or a request for special millage, although they may be called to approve some legislative matter, such as open housing.

REZONING APPLICATION FEE

The rezoning application fee is a charge of $100, which is assessed for each rezoning request submitted by a Developer or Industrialist. It is included in that player's financial statement for the next cycle.

RINGELMANN NUMBER

The Ringelmann Number is a code for measuring the blackness of smoke plumes and is equivalent to the opacity. Ringelmann Numbers and opacities are used for specifying allowable smoke emissions (Ringelmann for black and opacity for other colors). #0 = zero opacity, #1 = 20%, #2 = 40%, #3 = 60%, #4 = 80%, #5 = 100%. In APEX, all smoke readings are reported as Ringelmann Numbers.

STATE EQUALIZED VALUE

State equalization is a process designed to even out differences in assessment practices among political jurisdictions. The state equalization factor applied to each jurisdiction's assessed value will thus be different. The state equalized value for a jurisdiction, reached by applying the factor to local assessed value, is the base on which millage is levied to generate property tax revenues.

STINKELMANN NUMBER

The Stinkelmann Number is a code (developed in APEX) for measuring odor emissions, and for specifying maximum allowable odor emissions. Numbers range from 0-5, covering least to worst odor levels, respectively.

TAX RATE

See MILLAGE.

UNIT COSTS

The costs to the Industrialist of operating his plant are calculated, for each production component, except labor, on the basis of the amount and cost of each component required to produce one unit of the product. These unit costs apply to fuel, administrative overhead, inventory, and raw materials.

Fuel Cost applies to the fuel required to produce each Industrialist's product and will be different for each fuel type.

General Administrative Costs include all overhead expenditures, other than salaries, involved in production.

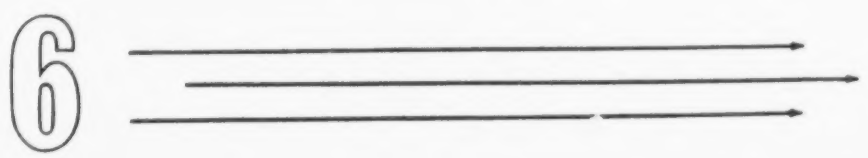
Inventory Carrying Costs must be paid to store product inventory from one cycle to the next. This cost excludes property taxes on inventory.

Materials Costs include all raw materials required to produce the product, except fuel.

The unit costs for each of these components which are applicable for a particular Industrialist for the next year are included in that player's output.

UNIT SALES PRICE

This is the price, which an Industrialist sets each cycle, at which he will sell a unit of his product. Each Industrialist has complete control over price, although the number of units he actually sells will be dependent on the relationship of his price to supply-demand conditions in the general market, and to the current average industry-wide price (reported for the last three years in the Industrialist's output).



ZONING CATEGORY

Zoning categories apply only to vacant land for APEX. Each of the six zoning categories may be developed into one or more types of land use:

ZONING CATEGORY

Zoning categories apply only to vacant land for APEX. Each of the six zoning categories may be developed into one or more types of land use:

FROM	TO
Zoning Category	Developed Land Use Type(s)
(1) R - Single-family residential	(1) R-1 (low density, high cost) (2) R-2 (medium density, medium cost) (3) R-3 (high density, low cost)
(2) M - Multiple-family residential	(4) M-1 (low density, low cost) (5) M-2 (medium density, low cost)
(3) C - Commercial	(6) CL (Commercial-Local) (7) CR (Commercial-Regional)
(4) I - Industrial	(8) I (endogenous industry) (9) I (exogenous industry)
(5) O - Bureaucratic	(10) O (exogenous bureaucratic)
(6) A - Agricultural	(11) A (active farming)

SECTION 3. DEVELOPER ROLE DESCRIPTION

The output which a Developer receives each cycle of APEX records the major decisions by that Developer during the preceding cycle and includes data on which decisions required in the next cycle must be based. In APEX the subgame played by the Developer, like that of the Industrialist, is a business game in its own right. The Developer and Industrialist are the primary representatives in the game of private interests. The degree of the Developer's involvement in public policy questions, like the Industrialist's, is largely a matter of the individual player's wishes.

The major activities of the Developer focus on the desire for profit through real estate operations. In this pursuit the Developer has a number of decision options available, including:

* buying and selling vacant land in any of the 29 analysis areas, in any of six zoning categories: single-family residential, multiple-family residential, commercial, industrial, office, agricultural; (See Glossary, "Zoning Category")

* buying developed land to redevelop into another use;

* seeking to rezone land which he owns, for which he must get the approval of the Planner and final consent from the Politicians;

* developing land into any one of five residential or two commercial uses or into one industrial use; (see Glossary for allowable development types, construction costs and densities);

* selling his developed property, either to another player in the game or to the general market, which represents the non-gamed economy;

* investing in incoming exogenous industry (exofirms).

The Developer can survive as a businessman only by coming out in the black each year. A variety of activities affect his successful operation (over some of which he has little control). The likelihood of sales, and the prices he can get for his offerings, depend upon the demand of the general market in the area of his holdings, generated by the general growth of the area. He must plan far enough ahead so that he has land in his possession, ready for development, at the time when it is most profitable to develop.

Thus it is important that the Developer form a sound strategy for estimating future demand, both in terms of what type of development will be desired and in which of the 29 analysis areas this demand will be heaviest. He may try to build demand for the residential and commercial developments with which he deals by working with the Politician to induce new Exofirms to enter a particular area, a step which may require public

capital improvements as well as local private investment.

A second important means by which the Developer may profit from business activities is through investment in Exofirms (exogenous industries) which have expressed, through the newspaper, a desire to locate in some portion of the County. Usually some investment by local people, particularly the Developers, is necessary as a token of local interest in the Exofirm's entry into any area in the County. In making such an investment the Developer is speculating on the firm's entering the area -- if it fails to enter, the investment is nullified. Although the Developer may purchase industrial land, he should keep in mind the fact that Exofirms announced in the newspaper have already purchased options (from the general market) on particular sites, so they will not be looking to buy land from any of the gamed Developers.

In addition to the decision options listed above, the Developer must make some other decisions each cycle.

* He must vote on public issues which arise in the newspaper and for which an Elite Opinion Poll is requested;

* He must pay his taxes or risk losing some of his property for tax delinquency;

* He must make payments on any loans he has taken out or risk losing his credit rating, and thus his ability to borrow more at good interest rates.

The Developer from time to time may be confronted with other possible decisions, such as giving or loaning money to another player; making campaign contributions for or against the re-election of a particular Politician or for or against a bond issue or special millage sought by a Politician; and voting in informal Elite Opinion Polls on air pollution or public finance questions. He may also request loans from a Central Bank, up to a total amount specified in his output. These loans will be granted, so long as they do not exceed the limit; the money becomes available at the beginning of the cycle.

In order to proceed intelligently on development activities, the Developer may wish to make use of contacts with other players, particularly the Planner, who have specialized information which is useful to him. He will also want to keep track of:

* amounts of available land in various zoning categories in the different analysis areas -- shown in the "Property Distribution" table posted on the wall each cycle;

* his own property holdings in the various areas -- shown in his own computer output;

* the permitted dwelling unit densities in residential zoning categories for the different analysis areas -- shown in the Density Table in the Glossary;

* the costs to construct different types of buildings -- given in the Glossary under "Development Types"; and

* the sales price of developed property of different types, varying by analysis area -- shown in the "Price" table which is posted each cycle.

SECTION 4. ANNOTATED DEVELOPER WORKSHEET

The Developer Worksheet has three parts: (1) the Elite Opinion Poll, (2) the Estimated Income and Expenditures, and (3) a News Release. He will be asked to fill out each part each year, and space has been provided for decisions over one year only. At the end of each cycle, these decisions will be transferred to the computer. This worksheet will be the official record of his actions and decisions as a Land Developer. It should be clear that he may make decisions in any order that is logical, and does not necessarily have to follow the order of the worksheet. The worksheet is merely to serve as a guide to help in the decision making process.

I. ELITE OPINION POLL

Each year, certain issues will appear in the APEX Gazette which require decisions from all role players, acting as the "elite", or power structure of the community. In some cases, the decision of the elite is binding on the Politicians and the poll can be considered the same as submitting a referendum to the voters. Here, the Gazette will read "Decided by Opinion Poll Majority". In other cases, the decision of the elite is merely advisory, and the Politicians can decide whether or not to heed their mandate. Here, the Gazette will read "Politician's Ultimate Decision, but Elite Opinion Solicited".

The outcome of the vote will be recapitulated in the next cycle's newspaper. For each issue outcome, the newspaper will also print the reactions of five pressure groups--Civil Rights Group, Good Government League, Chamber of Commerce, Unions, and Ultra-Conservatives.

Players should vote on all issues in the Elite Opinion Poll, including those on the Business Page. Each role will have one vote. In the cases where there is more than one person in a role, they will have to come to an agreement.

The Elite Opinion Poll is especially important to the Politicians because their actions relative to the poll may affect their chances for re-election.

Instructions: Indicate your Developer number and the cycle number in the space at the top of the page. Then put the issue number in the left hand column (this should not be confused with a project number), and the number of the alternative chosen in the adjacent column.

II. CASH BALANCE AND CYCLE INCOME

Estimated Income is the sum of the Cash on Hand, Interest on the Cash, Cash Transfers (from other players), Estimated Return from Exofirm Investments, and Estimated Land Sales.

A. Cash on Hand

The Cash on Hand for the upcoming cycle can be found opposite "Net Cash Balance for Cycle" on the printout under Section III (Current Cash Position).

B. Interest on Cash on Hand

The interest rate on the Cash on Hand is set permanently at 5%.

Instructions: Multiply the Cash on Hand by the Interest Rate of five percent to get the total interest for this cycle.

Example:

II. CASH BALANCE AND CYCLE INCOME

A.	Cash on Hand	$900,000
B.	5% Interest	x .05
		$ 45,000

C. Cash Transfers (from other players)

If another player in APEX transfers cash to you, it should be recorded here. (The player transferring the cash to you should also record it under "Cash Transfers to Other Players"). There may be many reasons for cash transfers between players. They can represent fees for services rendered, indirect campaign contributions, loan agreements between players, and so forth. They will be recorded under "Miscellaneous Notes" and "Income Calculated During Cycle" on your printout. Reasons for cash transfers do not have to be cited.

Instructions: Indicate the player role in the first column, the total amount of the cash transfer in the second, and the reason for the transfer in the third. Then total all estimated cash transfers.

Example:

C. Cash Transfers (from other players)

	Player	Amount	Reason
1.	*Ind #2*	*$2,000*	*Loan repayment*
2.	*Dev #6*	*600*	*Joint investment*
3.			
4.			
5.			

Total Cash Transfers *$2,600*

D. Estimated Return from Exofirm Investments

Another way in which the Developer may profit is through investing in Exofirms. A more complete explanation of the investment process is described later. Once investments are made, you may want to estimate your return. Investment returns for each cycle can be found on the printout under "Miscellaneous Notes" and "Income Calculated During Cycle" (part 4).

Instructions: You will want to anticipate a return ranging from 5 to 15% over the actual investment. Indicate the Exofirm Number as stated in the Business section of the Gazette in the first column. In the second column indicate the amount invested, and your estimated return in the third (amount invested and anticipated return). Total column 3 to get your Total Estimated Return on Exofirm Investments.

Example:

D. Estimated Return from Exofirm Investments

	Exofirm No.	Amt. Invested	Estimated Return
1.	*3*	*$20,000*	*$22,000*
2.	*27*	*$30,000*	*$33,000*
3.			
4.			

Total Estimated Return *$55,000*

E. Land Offerings and Estimated Sales of Developed Property

A final source of income for the Developer is through the sale of land. Your present land holdings are indicated under "Current Property Holdings After Cycle" on your output.

In order to estimate your sales revenue for a cycle, you should decide what action you wish to take on each piece of property (rezone, clear, develop, etc). You then decide what property you wish to hold and what you wish to sell. (NOTE: You may buy and sell vacant property in one cycle. If you wish to rezone or improve property, there is a one cycle delay before you can sell.)

You should consult with the planners to determine the sales potential of property. They have available information concerning growth and development patterns in each analysis area.

Remember that any estimate will be just that. You never have a guarantee that land offered to the general market will sell; therefore, estimates of market sales should be conservative.

The price you may expect to receive for developed property will be listed in the "Sales Price of Improved Property" table. The price for vacant land will be listed in the "Average Appraised Value of Improved and Vacant Property" table. This data may either be posted on the wall or obtained from the Planners.

Instructions: In column 1 indicate the analysis area in which your land is located, whether it is developed or vacant in column 2, and the zoning category in column 3. Column 4 should contain the intended purchaser (to whom you are selling the land). In column 5 indicate the number of units or the number of acres in column 6. Enter the price per unit or acre in column 7. Multiply columns 5 or 6 by column 7 to get the total price. Add the total price column and indicate this figure opposite "Total Price of Land Offerings". This is the amount you will receive if all property offered is sold. As indicated above, it is unlikely that all property will sell. You may wish to estimate your land sales as less than the total price of land offerings, using a conservative estimate of what the Planners' data indicates will sell.

Example:

METRO-APEX -- 9/ 9/71 -- DEVELOPER NUMBER 4 -- CYCLE 1, PAGE 30
PRINCIPLES OF AIR POLLUTION CONTROL TEAM 1

CURRENT PROPERTY HOLDINGS AFTER CYCLE 1

(DEVELOPED RESIDENTIAL IN UNITS, ALL OTHER VALUES ARE IN ACRES)

		RESIDENTIAL					NON-RESIDENTIAL					
		SINGLE			MULTIPLE		COMMERCIAL		INDUSTRIAL		OFFICE	AGRICULT
AA	STATUS	R-1	R-2	R-3	M-1	M-2	LOCAL	REGIONAL	LOCAL	EXOG.	EXOG.	
15	DEVELOPED	0	8	9	C	C	C.C	0.0	0.0	0.0	0.0	0.0
	VACANT	4.17			C.C		0.0		0.0		0.0	C.C
20	VACANT	0.0			E.CC		3.CC		0.0		0.0	0.0

E. Land Offerings and Estimated Sales

	AA	Vac/ Dev.	Zone Cat.	Buyer	No. of Units	or	No. of Acres	Price/Acre Price/Unit	Total Price
1.	*15*	*Dev*	*R-2*	*Market*	*6*			*$50,000*	*300,000*
2.	*15*	*Vac*	*R*	*Ind 3*			*4*	*$20,000*	*80,000*

Total Price of Land Offerings *$380,000*

Estimated Land Sales *$200,000*

III. ESTIMATED EXPENDITURES

Estimated Expenditures include: Loan Payments, Property Taxes, Campaign Contributions, Cash Transfers (to other players), Exofirm Investments, Zoning Application Fees, Land Clearance Costs, Land Purchases, Building Development Costs, and Vacant Land Improvement Costs.

A. Loan Payments

Payments due each year on any outstanding loans are indicated on your printout under "Outstanding Debits", section B. Each minimum payment due includes both principal and interest. You are assigned a loan number by the computer and this number can be found on your printout. You are also shown the number of years you have left to pay off the loan, the interest rate, and the balance due. If you wish to pay off a loan early, you must pay the balance due plus one year of interest on that balance. For example, if you have 15 years left on a loan with a balance due of $150,000 at an interest rate of 12 percent, you would have to pay $168,000 to complete your loan payments early. If, on the other hand, you do not meet the minimum loan payment due in a cycle, you will have to pay an under payment penalty which increases each cycle on delinquent payments. A repeated failure to meet loan payments will affect your credit rating, and hence, the interest rates available to you for future loans.

Instructions: In column 1 of the worksheet indicate the number of the loan (assigned by the computer). Then in column 2 show the amount of the loan payment you would like to make. Finally, total all loan payments.

Example:

B. LOANS

NO.	BALANCE	RATE	YRS LEFT	UNDERPAYMENT PENALTY	MIN PAYMENT DUE CYCLE 2
8	$ 25CCCC.	8.C	1C	$ C.	$ 37258.
SUBTOTALS	$ 25CCCC.				$ 37258.

A. Loan Payments

	Loan No.	Amount
1.	*8*	*$37,257*
2.		

Total Loan Payment *$37,257*

B. Property Taxes

Each Developer must pay taxes to the jurisdiction in which his property is located as well as to the County, which includes all property in APEX. If you fail to pay taxes, a delinquent payment of 6% must be paid. Your property will be confiscated by the jurisdiction in which the taxes are owed after two cycles of delinquency. The taxes due each cycle to the various jurisdictions can be found on your printout under "Outstanding Debits." It should be noted that the tax rate is set by the Politicians, and as citizens, voters, and taxpayers you may be able to influence it.

Instructions: Indicate in column 1 the jurisdiction to which your taxes are owed, and in column 2 the amount to be paid. The sum of these payments will give you your total property taxes.

Example:

IV.OUTSTANDING DEBITS

A. PROPERTY TAXES

	CURRENT		DELINQUENT AMT + 6.00 PERCENT		MIN PAYMENT DUE CYCLE 2
JURISDICTION 1 --	$ 0.	+ $	0.	=	$ 0.
JURISDICTION 2 --	$ 0.	+ $	0.	=	$ 0.
JURISDICTION 3 --	$ 0.	+ $	0.	=	$ 0.
JURISDICTION 4 --	$ 7755.	+ $	0.	=	$ 7755.
JURISDICTION 5 --	$ 833.	+ $	0.	=	$ 833.

SUBTOTAL -- DUE IN CYCLE 2 $ 8588.

B. Property Taxes

Jurisdiction	Amount
1. *4*	*$7,433.*
2. *5*	*$ 799.*
3.	
4.	
5.	

Total Property Taxes *$8,232.*

C. Campaign Contributions

Campaign Contributions can be made for or against incumbent Politicians, and these will be tallied within the computer at election time. You may want to run for election yourself, and challenge one of the Politicians. To run for election, you must simply declare your intent to run at least one cycle before the election. If more than one player decides to run against a particular Politician, a caucus will be required to identify a single opponent in the election. If no player chooses to run against a particular Politician, a simulated

opponent will stand in. In this case, a campaign contribution against the incumbent is a contribution for the opponent simulated by the computer. In addition to contributions for Politicians, it is possible to make contributions for or against bond issues or millages. The bond or millage numbers must correspond to numbers on the bond and special millage requests submitted by the Politicians.

Instructions: In column 1 indicate the Politician or the Bond or Millage Number. In column 2 indicate the amount of the contribution, and in column 3 whether it is for or against the Politician, bond or millage. Then total all contributions.

Example:

C. Campaign Contributions

	Pol/Bond/Mill No.	Amount	For/Against
1.	*CC Pol - Ward 1*	*$5,000*	*for*
2.	*County Pol - Sub.*	*8,000*	*against*
3.	*Bond Number 412*	*2,000*	*for*

Total Campaign Contributions *$15,000*

D. Cash Transfers (to other players)

Cash transfers, as mentioned above, can be used for many different purposes. One common use is to pay for loans between players, because the interest rate the computer has to offer is too high, or because a player has reached his limit on loans available through the computer. Another use for cash transfers is to pay for space in the APEX Gazette or for broadcasting time which can be used to advertise products, make campaign speeches, publicize activities, and so forth. A record of any cash transfers appears under "Miscellaneous Notes" and under "Expenditures" (Section II, A, 7) on your printout.

Instructions: Indicate the player to whom you are making a cash transfer in the first column, the amount of the cash transfer in the second column, and the reason in the third. You may choose to keep the reason for the cash transfer confidential, and leave the "Reason" column blank.

Example:

D. Cash Transfers (to other players)

	Player	Amount	Reason
1.	*Ind. 5*	*$6,000*	*loan payment*
2.	*Game Op.*	*800*	*APEX Gazette*
3.			

Total Cash Transfers *$6,800*

E. Exofirm Investments

An Exofirm is any firm or exogenous industry which depends upon markets outside the local area for its growth and vitality. Each cycle, the Business Page of the APEX Gazette lists "New Firms Planning to Come to APEX". Many of these new firms will list investment opportunities for a Developer. Only those firms which specifically note an investment opportunity may be invested in and the investment may not exceed the amount specified.

These entries will be accompanied by data regarding the firm and conditions which must be met before the firm can locate in APEX. The name and number of the Exofirm are listed along with up to 3 preferred locations. A firm does not necessarily have to locate in any one of these 3 areas. With Politician and Planner approval, a firm may be located in any of the 29 analysis areas. A Developer must initiate the location change, however.

In order for a firm to enter APEX, the Politicians must meet the conditions outlined in the paper, i.e., streets, sewers, and/or rezoning in the analysis area in which the firm will locate. A Developer must also invest where there are investment opportunities, if the firm is to enter.

The Developer may profit from Exofirm investments in two ways: first, he receives a return on these investments; second, (and probably most important) new firms locating in APEX add additional tax base, new employees, and therefore, create a demand for housing and commercial developments. This demand may raise both the sales price and the chance to sell property in an analysis area where market sales were formerly impossible.

You need not be concerned about owning or purchasing the necessary acres of land for a firm to locate. Assume the firm has purchased options on this land prior to the public announcement and will not deal with a particular Developer.

Exofirm Investments are recorded under "Miscellaneous Notes" and under "Expenditures" (Section II, A, 6) on your printout.

Instructions: In the first column, list the Exofirm number as given in the Gazette. The second column will contain the preferred location, and the third column, the amount invested. Finally, total all Exofirm investments.

Example:

E. Exofirm Investments

	Exofirm No.	Preferred Location	Amount
1.	*3*	*A.A. 23*	*$20,000*
2.	*27*	*A.A. 28*	*$30,000*
3.			

Total Exofirm Investments *$50,000*

F. Land Purchases

All property, whether vacant or developed, is purchased from the market at or above the appraised value price. You may purchase land from other players at any price they set.

Several considerations should be made prior to purchasing land. First, is there land available in the zoning and land use category where you want to buy? (See Glossary for zoning and land use categories.) If no land is available, it is a good idea to check on the likelihood of rezoning approval before actually purchasing the land.

Second, what are you intending to do with the property--build, sell, etc? It is unlikely that you will profit from buying vacant land and selling it as vacant land in the same zoning category. If you intend to build, will the sales price cover the initial cost of the property and the building and improvement costs? If so, is there a demand for the property you are selling? Consult with your Planners and check all the relevant data available.

It may be wise to work from a check list:

A. Is there land available? Yes ☐ No ☐

B. What is the cost? $_____

C. Will rezoning be approved, if necessary? Yes ☐ No ☐

D. What is the construction cost? $ _____

E. What is the improvement cost? $ _____

F. What is the sales price? $ _____

G. Is the sales price higher than the total of B, D & E? Yes ☐ No ☐

H. Is there a demand? Yes ☐ No ☐

When developing residential property you must consult the housing density chart in the Glossary. Although property may seem reasonably inexpensive, you may find you need several acres of land to build one unit, decreasing your potential profit. Developed residential property is always in units; all other is in acres.

Either use the checklist above or develop one of your own. All the above factors should be considered if property is to sell and sell at a profit.

A record of the land purchases will appear under "Miscellaneous Notes" on your printout. The expenses will also appear as "Expenditures" (Section II, B, 3) on your printout.

Instructions: In column 1 indicate the player from whom you are buying land, and in column 2 the analysis area of the land. Use column 3 to show whether the land is vacant or developed at the time of purchase and column 4 to indicate the zoning category or developed land use type. Use column 5 to show the number of units involved if the land is developed residential. All other property is recorded as acres in column 6. The negotiated or appraised value price per acre or per unit should appear in column 7, and the total price in column 8. Then total all land purchases.

Example:

F. Land Purchases

Seller	AA	Vac/ Dev.	Zone. Cat.	No. of Units	or	No. of Acres	Price/Unit Price/Acre	Total Price
1. *Market*	*6*	*vac*	*Resid*			*10*	*4,000*	*40,000*
2. *Ind 5*	*5*	*vac*	*Indus*			*3*	*10,000*	*30,000*
3.								

Total Land Purchases *$70,000*

G. Zoning Application Fees

There is a fee of $100 charged for each rezoning request that you submit. When you rezone developed property it automatically becomes vacant and you will be charged 5% of the appraised value of that property as a demolition fee. When rezoning developed property associated public rights of way will be reconverted to private property.

You may encounter many instances when rezoning is needed. First of all, property may not be available in the zoning category in which you need it, or, second, you may be able to buy it cheaper in another category. To assist you in these determinations, tables will be posted in the game room which indicate sales prices and appraised values for vacant and developed land. The Planners will also have this data.

All rezoning requests will be handled by the Planners. Approach them with your request and they will submit it for approval. Rezoning requests should have the Planner's recommendation and must have approval of the majority of Politicians. Your Planners will notify you whether the rezoning has been approved or rejected so you can record the fees on your worksheet.

Rezoning requests can only be submitted for land that you own. Any rezoning actions will be recorded under "Miscellaneous Notes" and under "Expenditures" (Section II, B, 4) on your printout.

Instructions: In column 1 record the analysis area of the land you would like to have rezoned and in column 2 indicate whether this land is presently vacant or developed. Then in column 3 indicate the present zoning category, or the developed land use type, whichever is appropriate. Column 4 should contain the desired new zoning category. (Note again that when property is rezoned, it automatically becomes vacant). Column 5 should show the number of units of the land if it is developed residential, otherwise use column 6 to indicate the number of acres. A fee of $100 goes in column 7. Remember, this form is only for your record; all rezoning must be transacted through the Planners.

Example:

G. Zoning Application Fees

	AA	Vac/ Dev.	From?	To?	No. of Units	or	No. of Acres	Fee at $100 per appli.
1.	*8*	*vac*	*Comm.*	*Indus*			*2.3*	*$100*

Total Zoning Application Fees *$100*

H. Land Clearance Costs (Demolition)

As discussed above, when property is rezoned it automatically becomes vacant and a 5% demolition fee is charged on the appraised value of the developed property. Land clearance costs will be recorded under "Expenditures" (Section II, B, 4) on your printout.

Instructions: *In column 1 indicate the analysis area. In column 2 the total value of the developed property being rezoned (according to the appraised value tables). Column 3 remains constant with a .05 percent demolition rate. Multiply column 2 by column 3 to get the land clearance cost for column 4. The sum of column 4 will give you the total land clearance cost.*

Example:

H. Land Clearance Costs (Demolition)

	AA	Total Value of Developed Property being Rezoned	Demo. Rate	Land Clearance Cost
1.	*23*	*$80,000*	*.05*	*$400*
2.				
3.				

Total Land Clearance Costs *$400*

I. Building Development Costs

As Land Developers, your primary means of making money is through the sale of developed property. The development process is a simple one, but also costly. Before property is developed, you will want to be sure: (a) there is a buyer for this property, and (b) you will profit from the sale.

The housing density chart is extremely important in the development of residential land. Vacant residential property is purchased in acres, but is developed into units. Be certain you have purchased enough acres to provide you with the intended number of units.

When property is vacant, it is zoned in any one of six categories. However, once you decide to build, you must specify a land use category. There are 11 such land use categories.

Zoning Categories (for vacant land)

Single Family Residential	Multiple Family Residential	Commercial	Indus.	Office	Agri.
(1)	(2)	(3)	(4)	(5)	(6)

Land Use Categories (for developed land)

Single Family Residential			Multiple Family Residential		Commercial			Indus.	Office	Agri.
R-1	R-2	R-3	M-1	M-2	Loc	Reg	En	Ex		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)

As you can see, if you own vacant single family residential, and wish to build, you must specify either R-1, R-2, or R-3. (See Glossary for detailed information on Zoning Categories, Construction Costs and Housing Density.) You may not develop office or agricultural property. Building Development Costs are recorded under "Miscellaneous Notes" and "Expenditures" (Section II, B,2) on your printout.

Instructions: In column 1 indicate the analysis area in which you own vacant property and wish to develop. In column 2 you will list the development type according to the land use categories. Column 3 should show the number of units if the property is being developed residential. If the property is non-residential, show the number of acres in column 4. The costs per acre or unit may be found in the Glossary and should be indicated in column 5. Multiply either column 3 or 4 by column 5 to give you the total cost. Enter the sum of column 5 opposite Total Building Development Costs.

Example:

I. Building Development Costs

	AA	Development Type	No. of Units	or	No. of Acres	Cost/Unit Cost/Acre	Total Cost
1.	8	R-1	10			$ 40,000	$400,000
2.	10	Commercial			5	$100,000	$500,000
		Total Building Development Costs					$900,000

J. Vacant Land Improvement Costs

Improvement costs are fees to prepare raw land for development, including subdivision costs, sewer and water connections, drainage and engineering. Developers are required to pay improvement costs on all land on which they build structures.

Property improvement costs are on a per unit basis for residential and per acre for the others:

R-1	R-2	R-3	M-1	M-2	Comm	Ind
$1000	$800	$700	$600	$400	$5000	$5000

Once you have completed your building development costs portion of the worksheet, figuring out the Improvement Costs is very easy.

Instructions: Columns 1 and 2 or 3 would coincide with the figures on your Development Costs. In column 1 indicate the analysis area. If the property is being developed residential, column 2 will contain the number of units being developed. If the property is non-residential, column 3 will contain the number of acres being developed. Column 4 will contain the improvement cost per acre or per unit. Multiply column 2 or 3 by column 4 and indicate that figure in column 5. The sum of column 5 will give you the Total Vacant Land Improvement Costs.

Example:

J. Vacant Land Improvement Cost

	AA	Vacant Land Being Developed		Cost/Unit	Total
		No. of Units	No. of Acres	Cost/Acre	Cost
1.	5	5		$1000	$ 5000
2.	25		3	$5000	$15000
3.					

Total Vacant Land Improvement Costs $20000.

IV. ESTIMATED LOANS

In calculating loan estimations, there are two things to be kept separate. The first is cash requirements that can be met at any time during the year, and the second is cash requirements that must be met at the beginning of the next year. By using the categories under the "Financial Statement" on your printout, you can estimate your cash on hand for the coming year. If you have a cash deficit at this point, you will need to request a new loan to increase your total income. However, it is possible for you to have a cash surplus at this point, and still need a new loan. This is because there are certain cash requirements that have to be met at the

beginning of the next year. Property taxes and loan payments are in this category. These payments cannot come from income anticipated during the year. You must have enough cash left over from the previous year to cover these costs, or make up the difference with a new loan.

It is possible to request a new loan at this point even if you have a cash surplus. Any loans requested from the computer will automatically be granted at the beginning of each cycle as long as the total of all new loans requested does not exceed the maximum loan possible. This figure will be printed on your printout under "Maximum New Loan Possible" (Section VI, D). The maximum new loan possible is related both to your net worth and your existing indebtedness. Your credit rating each year will also be printed in this same section of your printout. The interest rate that is available to you will depend both on your credit rating and on the number of years you wish to take to repay the loan. The following chart indicates how interest rates will vary:

	Credit Rating		
Years to Repay	A-1	A-2	A-3
1-2	4%	6%	8%
3-5	6%	8%	12%
6-10	8%	12%	16%
11-20	12%	16%	20%

If you fail to meet your loan payments you risk having your credit rating dropped. From the above chart, you can see how this will also affect your interest rates. When a new loan is approved, the computer will assign the appropriate interest rate and this will appear on your output under "Outstanding Debits" (Section IV, B).

Because your income and expenditures are only rough estimates, you may have difficulty calculating a loan. One method is to total your estimated expenditures. If your total cash on hand is higher than your total expenditures, a loan is not necessary. If your expenditures exceed your total cash on hand, a loan should be requested to compensate for the difference. The interest rate on your loan may be determined by comparing the number of years to repay the loan and your credit rating (printout, Section VI, D) with the interest table above. Remember your total cash on hand is the sum of Cash Available and the 5% Interest on that cash. Do not add in your estimated income.

Instructions: In column 1 you will indicate the number of years you wish to repay the loan. In column 2 you will indicate the amount of the loan you are requesting.

Example:

C. Loan Requests

	Years for Repayment	Amount of Loan Requested
1.	*4*	*$445,500*
2.		
3.		
Total Loan Requests		*$445,500*

V. NEWS RELEASE

Players may, at any time, submit articles or headlines that they would like to appear in the APEX Gazette. If the editorial staff of the Gazette deems the article "newsworthy", there will be no cost. Otherwise the cost will be on the order of $100 per line. All articles are subject to review by the editorial staff.

SECTION 5-1

DEVELOPER'S WORKSHEET

I. ELITE OPINION POLL

Developer Number _____ Cycle Number _____

ISSUE NO.	ALTERNATIVE

Developer Number _____ Cycle Number _____

II. CASH BALANCE AND CYCLE INCOME

A. Cash on Hand $ _____

B. 5% Interest on Cash Balance $ _____

C. Cash Transfers (from other players)

	Player	Amount	Reason
1.			
2.			
3.			
4.			
5.			

Total Cash Transfers $ _____

D. Estimated Return from Exofirm Investments

	Exofirm No.	Amount Invested	Estimated Return
1.			
2.			
3.			
4.			
5.			

Total Estimated Return on Investment $ _____

E. Land Offerings and Estimated Sales

	AA *	Vacant/ Dev.*	Zoning Cat.*	Buyer *	No. of Units*	or	No. of Acres*	Price/Acre Price/Unit*	Total Price
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									

Total Price of Land Offerings $ _____

Estimated Land Sales $ _____

TOTAL ESTIMATED INCOME $ _____

III. ESTIMATED EXPENDITURES

A. Loan Payments

	Loan No.*	Amount*
1.		
2.		
3.		
4.		
5.		

Total Loan Payments $ _____

B. Property Taxes

	Jurisdiction*	Amount*
1.		
2.		
3.		
4.		
5.		

Total Property Taxes $ _____

C. Campaign Contributions

	Pol/Bond/mill #*	Amount*	For/Against
1.			
2.			
3.			
4.			
5.			
6.			

Total Campaign Contributions $ _____

D. Cash Transfers (to other players)

	Player*	Amount*	Reason
1.			
2.			
3.			
4.			
5.			

Total Cash Transfers $ _____

E. Exofirm Investments

	Exofirm No.*	Preferred Location	Amount*
1.			
2.			
3.			
4.			
5.			

Total Exofirm Investments $ _____

F. Land Purchases

	Seller*	AA*	Vac/ Dev.*	Zoning Cat.*	No. of Units*	or	No. of Acres*	Price/Unit Price/Acre*	Total Price
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									

Total Land Purchases $ _____

G. Zoning Application Fees

	AA	Vac/ Dev.	From?	To?	No. of Units	or	No. of Acres	Fee at $100 per application
1.								
2.								
3.								
4.								
5.								
6.								

Total Zoning Application Fees $ _____

H. Land Clearance Costs (Demolition)

	AA	Total Value of Developed Property being Rezoned	Demo. Rate	Land Clearance Cost
1.			.05	
2.			.05	
3.			.05	
4.			.05	
5.			.05	
6.			.05	

Total Land Clearance Costs $ _____

I. Building Development Costs

	AA*	Development Type*	No. of Units*	or	No. of Acres*	Cost/Unit Cost/Acre	Total Cost
1.							
2.							
3.							
4.							
5.							
6.							

Total Building Development Costs $ _____

J. Vacant Land Improvement Costs

	AA	Vacant Land Being Developed No. of Units	No. of Acres	Cost/Unit Cost/Acre	Total Cost
1.					
2.					
3.					
4.					
5.					
6.					

Total Vacant Land Improvement Costs $ _____

TOTAL ESTIMATED EXPENDITURES $ _____

IV. ESTIMATED LOANS

A. Cash on Hand plus 5% Interest $ _____

B. Total Estimated Expenditures - $ _____

C. Loan Requests

	Years for Repayment*	Amt. of Loan Requested*
1.		
2.		
3.		

Total Loan Requests $ _____

Cycle Number _____

V. NEWS RELEASE

The following should be printed in the APEX Gazette: (please write clearly)

_____

_____

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NAME _____ ROLE _____

Section 7-1

BACKGROUND INFORMATION FOR DEVELOPER'S ROLE

The Planners in APEX have many tables which are useful to a Developer. Such tables include: a) Average Appraised Value of Improved and Vacant Property, b) Total Distribution of General Market Property, c) Sales Price of Improved Property, d) Total Property Distribution, and e) Potential Demand for Developed Property. The values of these tables change from cycle to cycle. Causes for change may include: capital projects and special programs initiated by Politicians; new firms locating in APEX; tax increases or decreases; air pollution problems, etc.

SALES PRICE OF IMPROVED PROPERTY:

This table is used only to check the sales price of developed property which you are selling to the market. It can be used as a guideline when selling developed property to other players. Residential property is indicated in dollars per unit, and non-residential in dollars per acre. A sales price is indicated for each of the 29 analysis areas and 11 land use categories.

METRO-APEX -- 6/ 6/71 -- GENERAL SUMMARY INFORMATION -- CYCLE 1, PAGE 114
PRINCIPLES OF AIR POLLUTION CONTROL TEAM 1

SALES PRICE OF IMPROVED PROPERTY
AT END OF CYCLE 1

NOTE -- PRICES FOR IMPROVED RESIDENTIAL ARE DOLLARS PER UNIT, ALL OTHERS ARE PER ACRE

	RESIDENTIAL					NON-RESIDENTIAL					
	SINGLE			MULTIPLE		COMMERCIAL		INDUSTRIAL		OFFICE	AGRICULT
AA	1	2	3	1	2	LOCAL	REGIONAL	LOCAL	EXCG	EXCG	
1	55493.	27393.	20000.	32265.	13500.	176787.	233118.	128260.	179564.	153700.	6360.
2	42314.	23392.	15452.	29707.	12415.	154419.	183823.	132131.	186560.	143100.	6360.
3	47203.	24990.	16894.	29936.	12514.	189825.	216747.	154760.	243376.	127200.	6360.
4	43901.	24700.	16800.	32600.	13500.	154441.	179693.	144160.	201824.	190800.	6360.
5	43500.	22194.	15131.	29500.	12685.	149091.	219950.	160060.	224084.	127200.	6360.
6	44805.	25158.	16645.	31356.	13171.	212561.	299331.	128260.	179564.	206700.	6572.
7	42858.	22673.	15154.	29617.	12444.	186129.	230685.	144160.	201824.	153700.	6360.

AVERAGE APPRAISED VALUE OF IMPROVED AND VACANT PROPERTY

This table is used for buying or selling vacant property and for buying developed property. Never use this table to determine what your sales price for developed property will be. Vacant property and developed non-residential property is shown in dollars per acre. Only developed residential property is indicated in dollars per unit. When purchasing property from the general market, the minimum dollar amount offered for this property should be at least at the Appraised Value price. Vacant property is divided into 6 zoning categories. Developed property is divided into 11 land use types.

METRO-APEX -- 5/ 5/71 -- G E N E R A L S U M M A R Y I N F O R M A T I O N -- CYCLE 1, PAGE 113
PRINCIPLES OF AIR POLLUTION CONTROL TEAM 1

AVERAGE APPRAISED VALUE OF IMPROVED AND VACANT PROPERTY
AT END OF CYCLE 1

NOTE -- VALUES FOR IMPROVED (I) RESIDENTIAL ARE DOLLARS PER UNIT, ALL OTHERS ARE PER ACRE

		RESIDENTIAL					NON-RESIDENTIAL					
		SINGLE			MULTIPLE		COMMERCIAL		INDUSTRIAL		OFFICE	AGRICULT
AA		1	2	3	1	2	LOCAL	REGIONAL	LOCAL	EXOG	EXOG	
1	DEV	40000.	21000.	10000.	28500.	13100.	166780.	219923.	121000.	169400.	145000.	6000.
	VAC		20000.		40000.		65000.		20000.		65000.	4800.
2	DEV	27500.	15700.	8100.	16000.	10000.	145675.	173418.	124652.	176000.	135000.	6000.
	VAC		7500.		24000.		45000.		25000.		80000.	4800.
3	DEV	30100.	16000.	11000.	19100.	11500.	170585.	204479.	146000.	229600.	120000.	6000.
	VAC		18000.		22000.		70000.		45000.		75000.	4800.
4	DEV	17200.	11500.	7400.	15000.	8500.	145699.	169522.	136000.	190400.	180000.	6000.
	VAC		8000.		35000.		45000.		35000.		85000.	4800.
5	DEV	21200.	11500.	7500.	16000.	9500.	140652.	207500.	151000.	211400.	120000.	6000.
	VAC		5000.		22500.		40000.		50000.		65000.	4800.

TOTAL DISTRIBUTION OF GENERAL MARKET PROPERTY

In the process of purchasing property you will want to know if available property actually exists in a particular zoning category or land use type within an analysis area. A failure to consult this table could result in a miscalculation of projected income and expenditures. This table applies to both vacant and developed property. Vacant property and developed non-residential property is indicated in number of acres available. Developed residential property is in units available. In cases where no property is available from the general market, you may wish to inquire as to whether another player owns property in that area and you may be able to negotiate a purchase from him.

METRO-APEX -- 5/ 5/71 -- COUNTY PLANNERS -- CYCLE 1, PAGE 112
PRINCIPLES OF AIR POLLUTION CONTROL TEAM 1

TOTAL PROPERTY DISTRIBUTION AFTER CYCLE 1
(INCLUDES ALL GAME PLAYER HOLDINGS PLUS GENERAL MARKET)

		RESIDENTIAL					NON-RESIDENTIAL					
		SINGLE			MULTIPLE		COMMERCIAL		INDUSTRIAL		OFFICE	AGRICULT
AA	STATUS	R-1	R-2	R-3/	M-1	M-2	LOCAL	REGIONAL	LOCAL	EXOG.	EXOG./	
1	DEVELOPED	429	488	363	372	313	0.70	19.75	34.34	53.07	1.92	0.0
	VACANT		476.60		10.80			2.56		91.49	5.13	0.0
	PUBLIC AND QUASI-PUBLIC DEVELOPMENT = 115.00 ACRES											
	COUNTY BUILDINGS, PARKS, ETC. = 0.0 ACRES											
	STREETS AND RIGHT-OF-WAY = 211.10 ACRES											
2	DEVELOPED	485	537	1133	679	999	69.97	88.45	7.61	27.53	51.56	0.0
	VACANT		0.37		52.64			0.85		178.98	0.09	0.0
	PUBLIC AND QUASI-PUBLIC DEVELOPMENT = 183.00 ACRES											
	COUNTY BUILDINGS, PARKS, ETC. = 0.0 ACRES											
	STREETS AND RIGHT-OF-WAY = 345.10 ACRES											
3	DEVELOPED	466	712	716	527	624	1.30	34.80	31.75	80.63	7.35	0.0
	VACANT		85.30		0.01			0.49		69.17	2.20	0.0
	PUBLIC AND QUASI-PUBLIC DEVELOPMENT = 272.00 ACRES											
	COUNTY BUILDINGS, PARKS, ETC. = 0.0 ACRES											
	STREETS AND RIGHT-OF-WAY = 224.40 ACRES											

MISCELLANEOUS INFORMATION

Additional information regarding the development of the community can be obtained from your Planners. In addition to the cycle by cycle data, you may wish to consult various reference materials, i.e., APEX Land Use Map, Planning documents, etc., if available.

DEVELOPER NUMBER 5

MISCELLANEOUS NOTES FROM CYCLE 1

METRO-APEX -- 5/ 9/71 -- DEVELOPER NUMBER 5 --
PRINCIPLES OF AIR POLLUTION CONTROL

MISCELLANEOUS NOTES FROM CYCLE 1

INVESTMENT OF A $ 50000. IN EXOFIRM A C -- NULLIFIED, NOT EN
$ 0. TOTAL INVESTMENT $ B 0

A Investment in an exofirm by the Developer is a token of local business community support for a new company locating somewhere in Apex County. If the firm enters the community the Developer will realize a return on his investment. The % of the
B return will vary with different exofirms. Investments may only be made in firms announced in the current cycles newspaper. Information found in the newspaper in-
C cludes the name and number of the firm, the type of company, the number of employees, the area of preference, and the services required of the Jurisdiction for the firm locating in Apex County.

Other tran
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-- DEVELOPER NUMBER 5 --

CYCLE 1, PAGE 33
TEAM 1

LLANEOUS NOTES FROM CYCLE 1

TRM A C -- NULLIFIED, NOT ENOUGH CASH

NVESTMENT $ B C. TOTAL RETURN

e Developer
mmunity
cating
firm enters
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l of firms.
in firms
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paper in-
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number
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eting in

Other transactions which may be found on this page include cash transfers to and from other players. Cash transfers are used for exchanges of money between players when the reasons for the exchange are unspecified.

DEVELOPER NUMBER 5

REAL ESTATE TRANSACTIONS BY DEVELOPER 5

(Except for sales

of developed property to market)

METRO-APEX -- 9/ 9/71 -- DEVELOPER NUMBER 5 --
PRINCIPLES OF AIR POLLUTION CONTROL

REAL ESTATE TRANSACTIONS BY DEVELOPER
(EXCEPT FOR SALES OF DEVELOPED PROPERTY TO MAR

Analysis Area

S A L E S

AA	(UP FOR SALE ARE) X UNITS OR ACRES	OF TYPE	(AT) $/U OR $/ACRE	TC	SOLD X	TOTAL PRICE	(BID FOR ARE) X UNITS OR ACRES	OF TYPE	$ $
24						20.0	V-R	C	$
TOTALS						$ 0.			

ACTION ON ZONING REQUESTS
APPROVED OR REFUSED IN CYCLE 1

AA NO.	OLD LAND USE	NEW LAND USE	NO. ACRES	DEMOL.
5	V-R	V-I	1.00	

*REZONING WAS APPROVED IF NO CAUSE

DEVELOPMENT OF VACANT LAND REQUESTS AND RESULTS IN

AA	REQUESTED DEVELOPMENT	OF TYPE	ACTUALLY DEVELOPED	C O S T S IMPROVEMENT	S
5	1.0 ACRES	I-L	1.0 ACRES	$ 5000.	$
17	4 UNITS	R-1	4 UNITS	$ 4000.	$
21	2 UNITS	R-1	2 UNITS	$ 2000.	$
TOTAL COSTS					

DEVELOPMENT OFFERINGS _ SUBSEQUENT SALES TO MAR

AA	OFFERINGS AMOUNT OF	DEVELOPED TYPE	SOLD AT	$/U OR/A
2	40 UNITS	M-2	9 UNITS	$ 12
5	1.00 ACRES	I-L	1.00 ACRES	$ 160
8	80 UNITS	M-2	80 UNITS	$ 16
17	4 UNITS	R-1	1 UNITS	$ 57
21	2 UNITS	R-1	2 UNITS	$ 71
TOTAL OF THESE SALES				

-- DEVELOPER NUMBER 5 --

STATE TRANSACTIONS BY DEVELOPER 5
SALES OF DEVELOPED PROPERTY TO MARKET)

	PURCHASES							
TOTAL PRICE	(BID FOR ARE) X UNITS OR ACRES	OF TYPE	(AT) $/U OR $/ACRE	FROM	BOUGHT X	DEMOL. COST	TOTAL COST
	20.0	V-R	$ 4000.	M	20.0	$ 0.	$ 80000.
0.							$ 80000.

ACTION ON ZONING REQUESTS
PROVED OR REFUSED IN CYCLE 1

LAND USE	NO. ACRES	DEMOL. COST	CAUSE FOR REFUSAL*
V-I	1.00	0.	

REZONING WAS APPROVED IF NO CAUSE FOR REFUSAL GIVEN

PLANT LAND REQUESTS AND RESULTS IN CYCLE 1

ACTUALLY DEVELOPED	COSTS FOR IMPROVEMENT	COSTS FOR STRUCTURES	TOTAL COST
1.0 ACRES	$ 5000.	$ 100000.	$ 105000.
4 UNITS	$ 4000.	$ 160000.	$ 164000.
2 UNITS	$ 2000.	$ 80000.	$ 82000.
			$ 351000.

OFFERINGS _ SUBSEQUENT SALES TO MARKET

DEVELOPED	SALES SOLD	AT	$/UNIT OR/ACRE	=	TOTAL $ FROM SALE
	9	UNITS	$ 12415.		$ 111737.
	1.00	ACRES	$ 160060.		$ 160060.
	80	UNITS	$ 16627.		$ 1330129.
	1	UNITS	$ 57394.		$ 57394.
	2	UNITS	$ 71000.		$ 142000.
					$ 1801318.

B Price
resid
resid
mass

D Market,
the non-gamed
component.

$ 80000.

E Land
Deve
prop
buy
buy t

F All
the B

G Impr
sewer

H Failu
an eff
partic

I Sales
depend

MOL. COST	TOTAL COST
0.	$ 80000.
meds	80000.

B Prices are quoted in $/unit for developed residential land, in $/acre for vacant residential and all other land uses whether vacant or developed.

C V = vacant land
R = single-family residential
M = multiple-family residential
C = Commercial land
I = Industrial land

E Land use type changes through rezoning. Developer may request rezoning only of property he owns. Requests must be initiated by the Planner and ultimately decided by the Politicians.

F All requested development may not occur if the Developer has insufficient land or cash.

G Improvement costs reflect site development, sewer and water connections; etc.

H Failure to sell all developed offered reflects an excess of supply over demand for the particular analysis area.

I Sales price may change from cycle to cycle depending on demand for property.

DEVELOPER NUMBER 5

CURRENT PROPERTY HOLDINGS AFTER CYCLE 1

(Developed Residential in Units,

All other values are in acres)

METRO-APEX -- 9/ 9/71 -- DEVELOPER NUMBER 5 --
PRINCIPLES OF AIR POLLUTION CONTROL

CURRENT PROPERTY HOLDINGS AFTER CYCLE 1

(DEVELOPED RESIDENTIAL IN UNITS, ALL OTHER VALUES ARE IN ACRES)

AA	STATUS	RESIDENTIAL					NON-RES	
		SINGLE			MULTIPLE		COMMERCIAL	
		R-1	R-2	R-3	M-1	M-2	LOCAL	REGIONAL
2	DEVELOPED	0	0	C	0	31	0.0	0.0
5	VACANT	C.0			1.CC		0.0	
17	DEVELOPED	3	0	C	C	0	C.0	0.0
	VACANT	6.67			C.0		0.0	
24	VACANT	20.00			C.C		0.0	

This table shows yo
this cycle includ
rezoning, develop
occurred during t

-- DEVELOPER NUMBER 5 --

ROPERTY HOLDINGS AFTER CYCLE 1

UNITS, ALL OTHER VALUES ARE IN ACRES)

I A L	//	N O N - R E S I D E N T I A L					
U L T I P L E	//	COMMERCIAL		INDUSTRIAL		OFFICE	AGRICULT
M-1 M-2	//	LOCAL	REGIONAL	LOCAL	EXOG.	EXOG.	
0 31	/	0.0	0.0	0.0	0.0	0.0	0.0
1.00	/	0.0		0.0		0.0	0.0
0 0	/	0.0	0.0	0.0	0.0	0.0	0.0
0.0	/	0.0		0.0		0.0	0.0
0.0	/	0.0		0.0		0.0	0.0

This table shows your status at the end of this cycle including all changes (purchases, rezoning, development, and sales) which occurred during this cycle.

DEVELOPER NUMBER 5

FINANCIAL STATEMENT AT END OF CYCLE 1

METRC-APEX -- 9/ 9/71 -- DEVELOPER NUMBER 5 --
PRINCIPLES OF AIR POLLUTION CONTROL

FINANCIAL STATEMENT AT END OF CYCLE 1

I. CASH BALANCE (INITIAL) & CYCLE INCOME

A. CASH ON HAND AT START OF CYCLE 1 ——————

B. INCOME CALCULATED DURING CYCLE 1

A	1.	5.CC PERCENT INTEREST ON ABOVE CASH BALANCE	$
	2.	NEW LOANS REQUESTED (AND APPROVED) ——	$ 2
	3.	DEVELOPED-LAND SALES TO MARKET	$ 18
	4.	RETURN FROM EXOFIRM INVESTMENTS	$
	5.	CASH TRANSFERS FROM OTHER PLAYERS	$
	6.	SALES OF LAND TO OTHER PLAYERS & VACANT TO MARKET	$
		TOTAL INCOME IN CYCLE 1 ——	$ 20

II. EXPENDITURES

A. NON-LAND EXPENDI

	1.	LOAN PAYMENTS	$
	2.	TAX PAYMENTS	$
	3.	DELINQUENT TAXES (LAND CONFISCATED)	$
C	4.	ZONING APPLICATION FEES ($100 PER APPLICATION) ——	$
	5.	CAMPAIGN CONTRIBUTIONS ——	$
	6.	INVESTMENTS IN EXOFIRMS	$
	7.	CASH TRANSFERS TO OTHER PLAYERS	$
		SUBTOTAL	

B. LAND EXPENDITURES

	1.	VACANT LAND IMPROVEMENT COSTS	$
	2.	BUILDING DEVELOPMENT COSTS	$ 3
E	3.	LAND PURCHASES	$
	4.	LAND-CLEARANCE COSTS (REZONED OR RAZED) ——	$
		SUBTOTAL	

C. TOTAL EXPENDITURES IN CYCLE 1 ——————

END OF CYCLE 1

$ 250000.

	$ 12500.	
	$ 200000.	B
	$ 1801318.	
	$ 0.	
	$ 0.	
MARKET	$ 0.	
	$ 2013818.	
	$ 0.	
	$ 24862.	
	$ 0.	
CN)	$ 100.	D
	$ 0.	
	$ 0.	
	$ 0.	
		$ 24962.
		—
	$ 11000.	
	$ 340000.	
	$ 80000.	
	$ 0.	
		$ 431000.
		$ 455962.

A These figures are summed fro preceding pages.

B Loans requested from the co granted so long as the total a the limit (See bottom of next p

C Campaign contributions may any Politician, bond issue, Developers may also campai

D A rezoning fee of $100.00 is a deducted for each rezoning p

E If developed land is rezoned it are automatically demolis 5% of the appraised value.

A These figures are summed from tables on the preceding pages.

B Loans requested from the Central Bank will be granted so long as the total does not exceed the limit. (See bottom of next page).

C Campaign contributions may be made against any Politician, bond issues, or special millage. Developers may also campaign for themselves.

D A rezoning fee of $100.00 is automatically deducted for each rezoning granted.

E If developed land is rezoned. The structures on it are automatically demolished at the cost of 5% of the appraised value.

DEVELOPER NUMBER 5

CURRENT CASH POSITION

METRC-APEX -- 9/ 9/71 -- DEVELOPER NUMBER 5 --
PRINCIPLES OF AIR POLLUTION CONTROL

III. CURRENT CASH POSITION

A. AMOUNT AT START OF CYCLE 1 $ 25
B. NET CHANGE (I.B - II.C) $ 15

NET CASH BALANCE FOR CYCLE 2 _____

IV. OUTSTANDING DEBITS

A. PROPERTY TAXES

	CURRENT	A DELINQUENT AMT + 6.00 PERCENT		MIN PA DUE CY
JURISDICTION 1 --	$ 5347.	+ $ 0. =		$
JURISDICTION 2 --	$ 5019.	+ $ 0. =		$
JURISDICTION 3 --	$ 382.	+ $ 0. =		$
JURISDICTION 4 --	$ 0.	+ $ 0. =		$
JURISDICTION 5 --	$ 852.	+ $ 0. =		$

SUBTOTAL -- DUE IN CYCLE 2

B. LOANS

NO.	BALANCE	RATE	YRS LEFT	UNDERPAYMENT PENALTY	MIN PA DUE CY
5	$ 200000.	8.0	10	$ 0.	$
SUBTOTALS	$ 200000.				$

C. TOTAL OUTSTANDING DEBITS -- (TAXES + LOAN BALANCES) _____

** NOTE -- CASH PAYMENTS DUE CYCLE 2 = $ 41406.
(TAXES + MINIMUM LOAN PAYMENTS)

V. FIXED ASSETS

	WORTH AT START OF CYCLE 1	D NET CHANGE	WORTH OF CY
A. VACANT LAND	$ 337500.	$ -68333.	$
B. DEVELOPED LAND	$ 1120000.	$ -676500.	$

TOTAL VALUE (STARTING CYCLE 2)

VI. FINANCIAL STANDING -- OVERALL

A. TOTAL NET WORTH (III+V-IV.B ABOVE)
B. NET WORTH AT END OF CYCLE 0
C. PERCENT CHANGE FROM CYCLE 0
D. MAXIMUM NEW LOAN POSSIBLE _____
AT YOUR CREDIT RATING OF A-1

$ 250000.
$ 1557856.

→ $ 1807856.

DELINQUENT AMT
+ 6.00 PERCENT

MIN PAYMENT
DUE CYCLE 2

+ $ 0. = $ 5347.
+ $ 0. = $ 5019.
+ $ 0. = $ 382.
+ $ 0. = $ 0.
+ $ 0. = $ 852.

$ 11600.

UNDERPAYMENT
PENALTY

MIN PAYMENT
DUE CYCLE 2

LEFT

$ 0. $ 29806.

$ 29806.

BALANCES) → $ 211600.

$ 41406.
S)

NET
CHANGE

WORTH AT END
OF CYCLE 1

$ -68333. $ 269167.
$ -676500. $ 443500.

$ 712667.

$ 2320522.
$ 1707500.
35.90
→ $ 556156.

A If cycle 1 payments (II
had been insufficient t
Penalty would show he
continues a second ye

B These payments must
to avoid penalties fo

C Loans must be paid
a drop in credit rat

D Net change is the resu
sales, and changes
rezoning or develop

CYCLE 1, PAGE 37
TEAM 1

86.

A If cycle 1 payments (II. A. 2. preceding page) had been insufficient to cover amount due, Penalty would show here. If delinquency continues a second year property is confiscated.

B These payments must be made in cycle 2 to avoid penalties for delinquency

C Loans must be paid in cycle 2 to avoid a drop in credit rating.

D Net change is the result of all purchases, sales, and changes in status through rezoning or development.

● 29 APEX ANALYSIS AREAS

TOWNSHIP 1

Areas 23, 24, 25, 26, 27 and 28

TOWNSHIP 2

Areas 14, 15, 16, 20, 21, 22 and 29

SUBURB

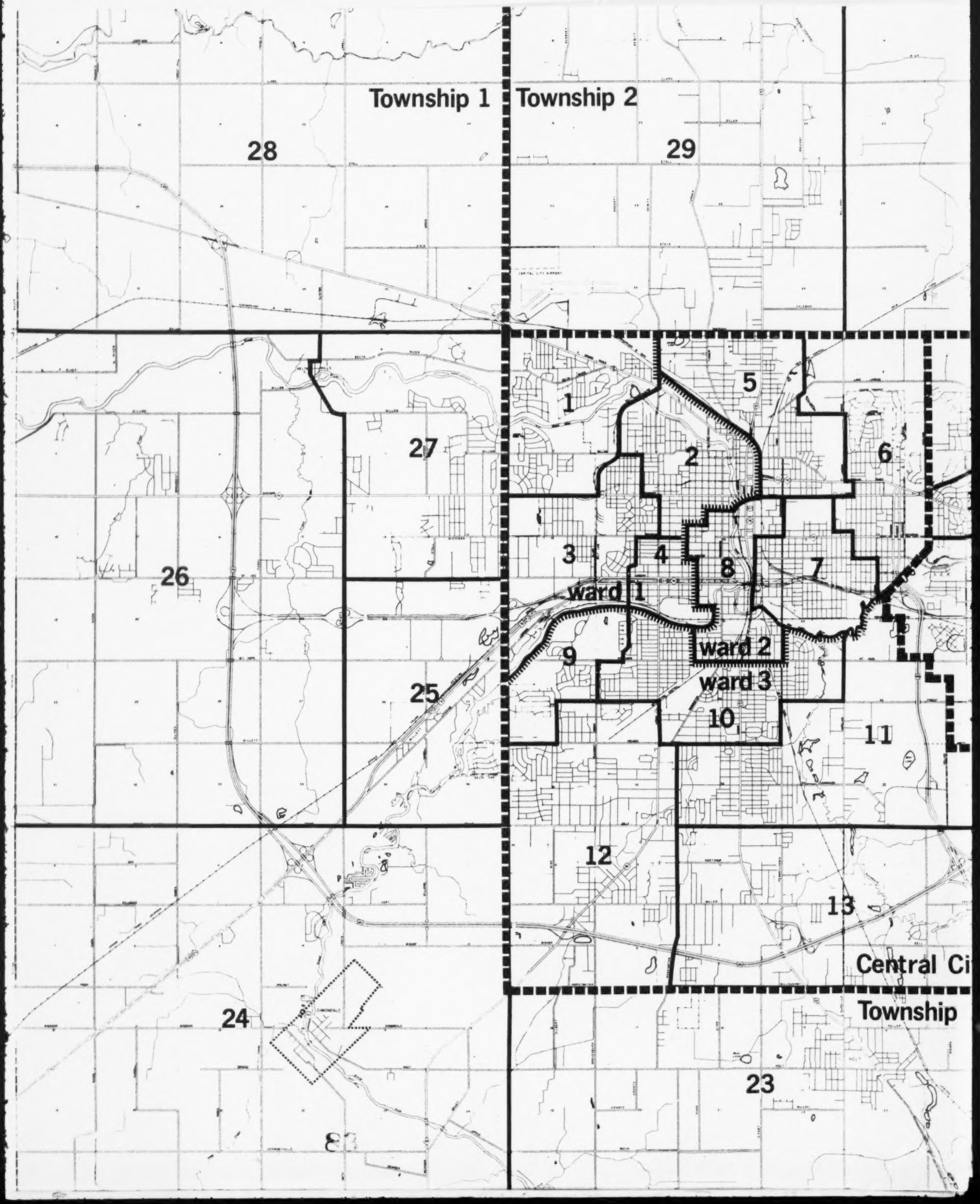
Areas 17, 18 and 19

CENTRAL CITY

Ward One: Areas 1, 2, 3, and 4

Ward Two: Areas 5, 6, 7 and 8

Ward Three: Areas 9, 10, 11, 12 and 13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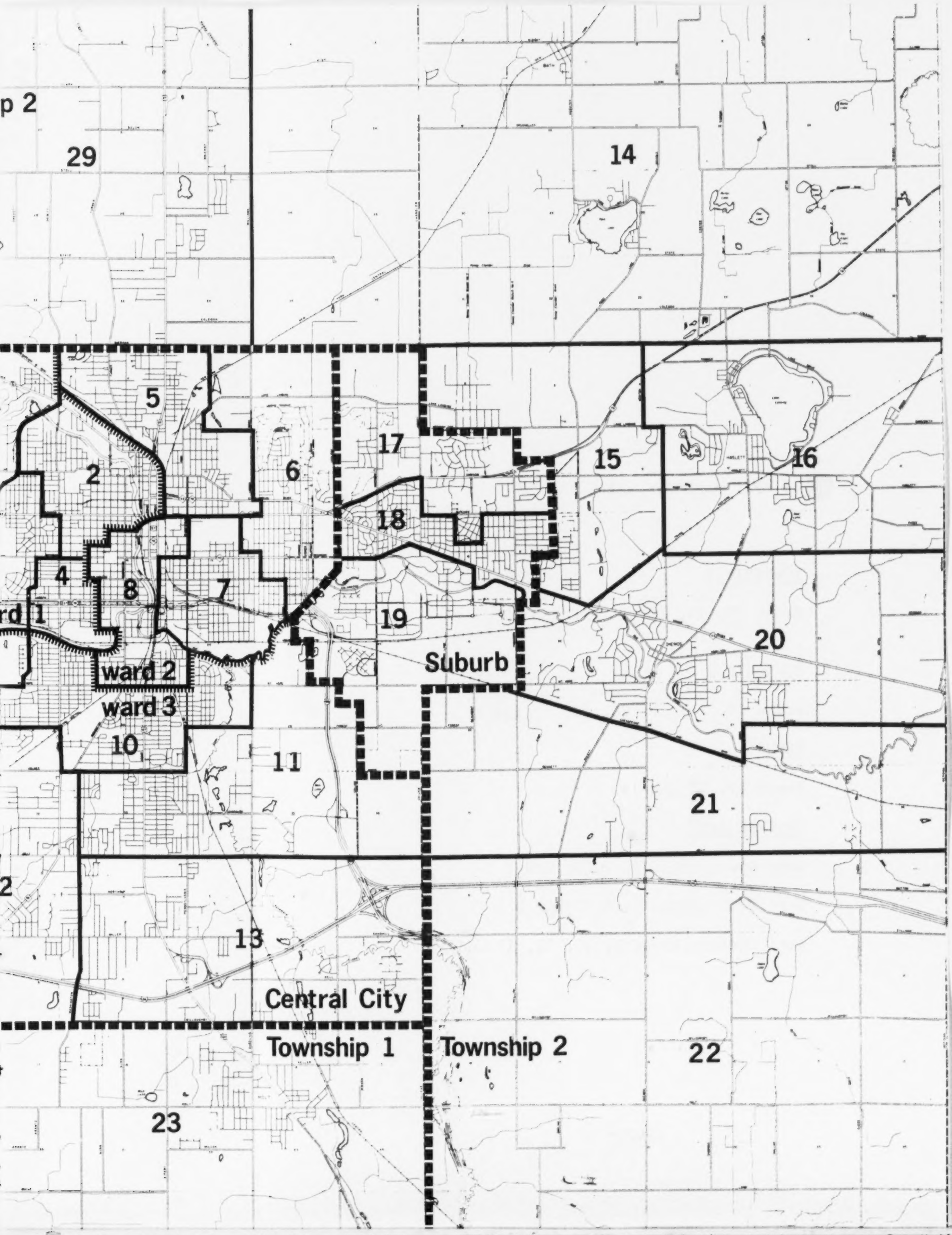
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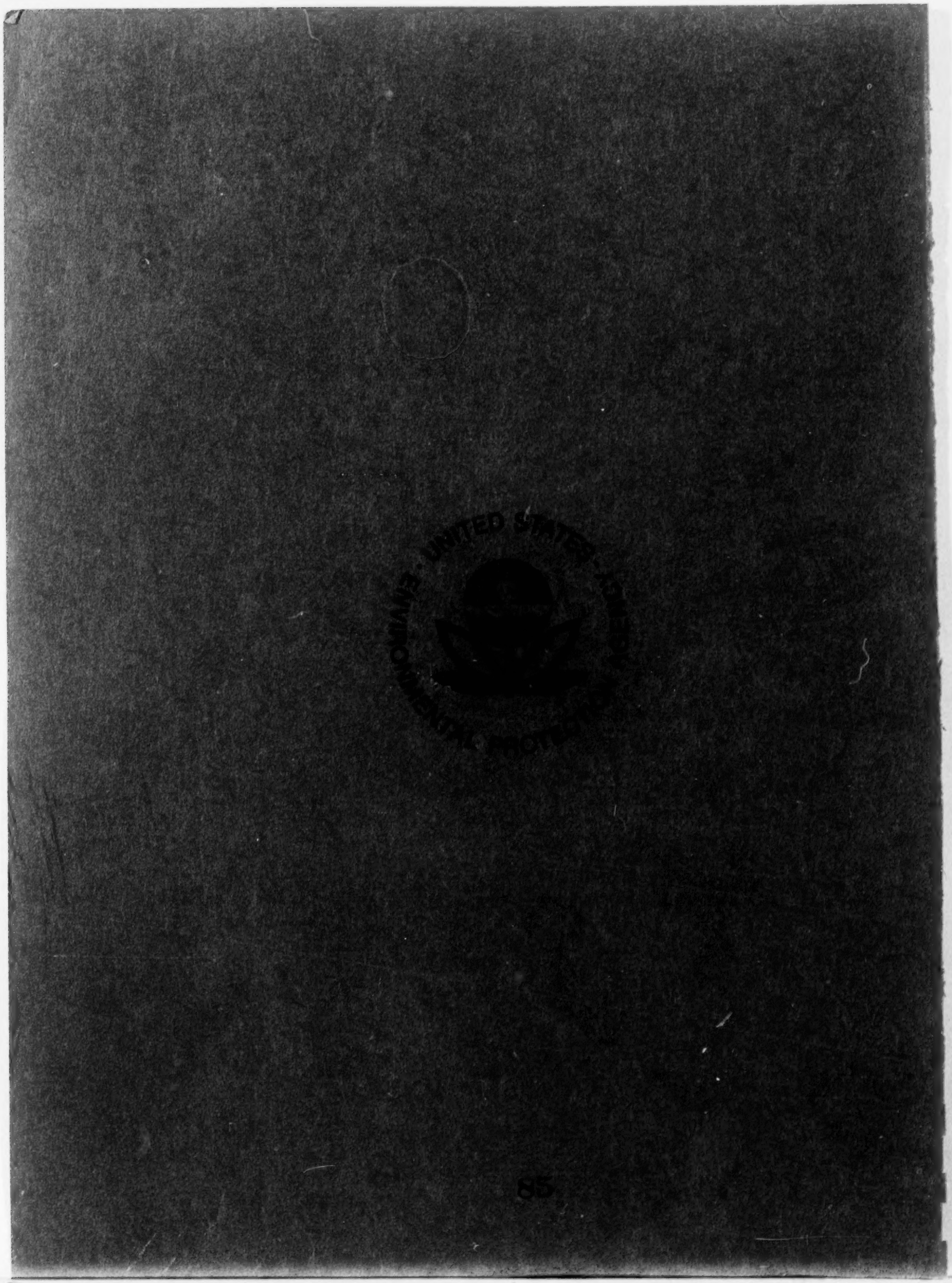
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